ROCK PRODUCTS

DECEMBER 1947

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

THE INDUSTRY'S RECOGNIZED AUTHORITY

Airplane view of Cuban Cement Corporation plant and quarry

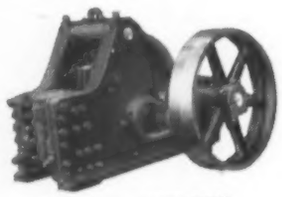
MACHINERY AND EQUIPMENT DEVELOPMENT REVIEW

STURTEVANT

Rotary Fine Crushers

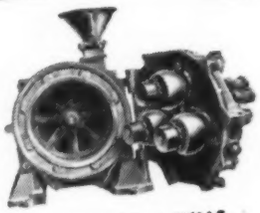
Provide Granular Products Without Excessive Dust

These fast, highly efficient crushers are designed to crush or granulate soft and moderately hard substances to fine even sizes without large amount of dust. They effectively handle materials up to and including the hardness of the softer limestone or cement clinker. The fineness of product is regulated by a hand-wheel. They produce a dependable quality of output from one inch to a quarter inch. Capacity ranges are available from one to 30 tons per hour depending on size of machine. Open door accessibility allows entire crushing area to be exposed for quick, easy cleaning. Write for information.



JAW CRUSHERS

for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS

for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. No scrapers, plows, pushers, or shields.

CRUSHING ROLLS

for granulation, coarse or fine, hard or soft materials. Precision and automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. Roller or Plain bearings. The standard for abrasives.

STURTEVANT MILL COMPANY

102 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • ELEVATORS • LABORATORY EQUIPMENT • MECHANICAL DENS AND EXCAVATORS • MIXERS

Where rubber lasted 14 times as long as steel

A typical example of B. F. Goodrich improvement in rubber

THAT rain of rocks formerly wore out half-inch steel plates every six months.

Gravel plants separate their stones by size, for different uses — and the big ones really punish anything they hit. To make it worse, the steel plates, onto which the stones used to slide, are hard to get at, and replacement was a nuisance as well as a high cost.

Someone had heard that B. F. Goodrich had a rubber called Armorite, specially compounded to stand this sort of beating. The plate that catches the rocks shown in the picture was covered with this BFG rubber seven years ago.

Since then 800,000 tons of gravel have been processed in this plant and there still is no sign of wear on this water-lubricated rubber. It has lasted 14 times as long as steel a half inch thick.

Developing special rubbers to meet special conditions like this is a regular occurrence at B. F. Goodrich. Don't think of rubber as a single material. B. F. Goodrich engineers have developed hundreds of rubbers to meet hundreds of special problems — to stand heat, acids, oils, sunlight, exceptional wear, abrasion, tearing and many other conditions. Don't decide that rubber cannot serve you or improve your product or process until you find out what B. F. Goodrich has developed. *The B.F.Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich

FIRST IN RUBBER

DECEMBER, 1947

ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 50, No. 12

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"WE HEAR..."

December, 1947

An employer cannot expect to get a court to dismiss a veteran's claim for re-employment under the Selective Service Act on the ground that the employe waited too long to file a suit. In a recent case, a federal district court refused to dismiss a suit where a veteran waited two years after discharge to bring suit, but had applied for reinstatement within the 90-day limit. No limit is fixed for starting suit.

* * * * * * * * * * *

One effect of the high costs of road construction is that many states are preparing for future construction, even though a great volume of work has been postponed. Many new surveys of highway construction needs are being conducted.

* * * * * * * * * * *

Under certain conditions, an employer can distribute sample ballots among employes, marked to designate an anti-union vote, if it is made clear that the employes can vote as they please in a collective-bargaining election. The main consideration in a recent case was whether or not employes were assured freedom of choice and whether or not there were threats of reprisals or promises of benefits.

* * * * * * * * * * *

Diversion of highway user funds to non-highway purposes amounted to $94,579,000 in 1946 according to Public Roads Administration figures. Rhode Island headed the list with 47.68 per cent of net funds diverted and Texas led in dollar amount, diverting $19,442,000 to other use. The total for the nation, while still substantial, represents a continued downward trend.

* * * * * * * * * * *

Latest estimates are that about $18 billion will be spent in 1947 for construction, maintenance and repairs of buildings, representing an increase of 23 per cent over 1946 and a much higher level than prewar annual averages. Yet, building expenditures will be only 9½ per cent of national income as compared with an average of 17 per cent in the building boom period following World War I. Construction costs, 100 per cent over those of the 1920's, however, distort the true relationship in terms of physical volume, which will actually be down 20 per cent.

* * * * * * * * * * *

October civilian employment totaled 59.2 million persons, reaching the highest level of employment since the Summer months of 1947. Unemployment for the month was estimated at only 1.7 million.

* * * * * * * * * * *

Contracts awarded for construction in the 37 states east of the Rocky Mountains during the first nine months of 1947 totaled $5,626,111,000, or a decline of 6 per cent from the corresponding three-quarters in 1946, says F. W. Dodge Corp. Projects classed as publicly-owned, accounting for 29 per cent by dollar volume of all building and construction contracts, however, are substantially higher than in 1946.

* * * * * * * * * * *

WE HEAR

A Commerce Department survey has revealed that home repair increased during the war. Ninety per cent of all dwelling units were in good condition in 1947, compared with 82 per cent in 1940. Reasons were that landlords operating under rent control could increase rents for repairs and much higher income was available for home upkeep.

* * * * * * * * * * *

For the first time in many months, the installation of new freight cars, in September, by the class one railroads exceeded retirements. The 7182 new cars put in service that month was the largest number since April, 1942.

* * * * * * * * * * *

It sounds too optimistic, but Rep. Ralph A. Gamble (R., N. Y.), chairman of the congressional joint committee on housing, has reported not only an appreciable easing in the housing shortage but had observed that lower prices definitely are in sight. His observations were based on visits of the committee to various cities over the country and, apparently, on promises from building material manufacturers that productivity would be increased.

* * * * * * * * * * *

According to "Limographs," published by the National Lime Association, the French sometimes use dolomitic lime instead of high calcium lime to remove silica where a high silica content is encountered in high pressure boilers using a hot lime-soda process.

* * * * * * * * * * *

There are some 355,000 miles of principal secondary and feeder roads, designated as part of the federal-aid secondary highway system, that are now eligible for federal-aid funds for improvement. This system, according to the A.R.B.A., supplements the 231, 285 mile primary federal-aid system and makes possible federal participation in the improvement of about 19 per cent of the total rural mileage.

* * * * * * * * * * *

Bureau of Reclamation is planning a seven-year program costing $2 billion that would double the irrigated farm lands of 14 western states. Some 4 million acres would be affected and the hydroelectric power to be made available would represent an increase of 2,250,000 kw. The Bureau has undertaken the biggest construction year in its history in 1947.

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Artificial crystals are expected to replace as much as 90 per cent of the natural quartz used in long distance telephone systems within a few years.

* * * * * * * * * * *

The U. S. Maritime Commission has issued a definition of creditable service that entitles members of the merchant marine to re-employment rights under the Selective Service Act, making it unsafe for employers to refuse reinstatement in employment to former employes who have served creditably in that branch of the service.

* * * * * * * * * * *

A recent ruling of a federal court gives some hope to employers in cases involving overtime payment under the Fair Labor Standards Act where there is both administrative work and manual work involved, in the case of an employe. It was ruled that an employe who devoted considerable time to non-manual work requiring independent judgment and discretion was exempt, as an administrative employe, from overtime payment.

* * * * * * * * * * *

About 30 industries are the subject of a study by the new industrial health section of the Maine Bureau of Health. The first study concerns feldspar plants and quarries among other industries.

THE EDITORS

★ ★ Editor's Page

The "NEW LOOK" in Machinery

THIS ISSUE of ROCK PRODUCTS is an equipment review number, in recognition of the industry's intense interest in machinery development. Having been deprived of new machinery over a protracted period of years and having gone through a period when machinery by necessity had to continue in operation far too long without necessary replacements or adequate repair parts, the industry has had an exceptional opportunity to judge the merits and weaknesses of its equipment. Producers therefore will be more critical than ever before in evaluating the merits of new machines and the redesigns for improved maintenance, in contemplating plant modernization and building.

Machinery manufacturers have been cooperative in advising us of new production equipment. They of course recognize the problems in the design and redesign of plants that will incorporate new equipment and desire to facilitate that job, but our equipment review herein nevertheless is by no means comprehensive. Much of the new machinery is still in process of development or perfection and will be announced when available. As they come into commercial production, it will be our purpose to present their special features in the pages of ROCK PRODUCTS.

Nature of Equipment Developments

Machinery and equipment developments have been directed toward improved operating efficiency and lowered maintenance, but even more important from the viewpoint of the rock products industry, there has been substantial progress that will contribute immensely to product improvement.

There has been a great deal of criticism of concrete in recent years, and both aggregates and cement are the focal points for intensive investigation in seeking ways to prolong durability. The aggregates and portland cement industries, whether or not criticism be justified, have consistently taken the position that everything will be done to produce the finest possible products that can be made available and it is evident that much of the postwar machinery development has been to help accomplish that objective.

Particularly noteworthy has been the emphasis on means to solve the problem of fine concrete sand recovery and classification for the attainment of accurate and uniform gradation. That problem is a quality consideration, provided for in specifications, although there is some disagreement as to the good and bad effects of large percentages of fines in mixing concrete.

If substantial minus 50-mesh particles and some finer than 100-mesh exist in a sand and gravel deposit, new postwar equipment will be beneficial to the recovery of the fractions sought in federal specifications and others of similar pattern. Machinery manufacturers have devised some relatively cheap devices that will solve the problem.

We refer to simple devices that are available for adaptation to sand settling such as lengthened weirs built into ordinary screw and rake-type washers, or attachable as accessories to standard units, to still the velocity of flowover and thereby prevent excessive loss of fines. Simple apparatus to regulate the various size fractions in sand are also of recent development.

Control of Variables

Instrument manufacturers have created ingenious equipment for process control, notably as applied to rotary kiln operation, which will contribute to uniform firing conditions and in turn reflect in product control.

Firing variables are rapidly being harnessed. Installations like the National Gypsum Co. new lime plant at Kimballton, Va., discussed in this issue, suggest that the time may not be far off when rotary kilns will be entirely automatic in operation even with all the related and fluctuating variables associated with firing.

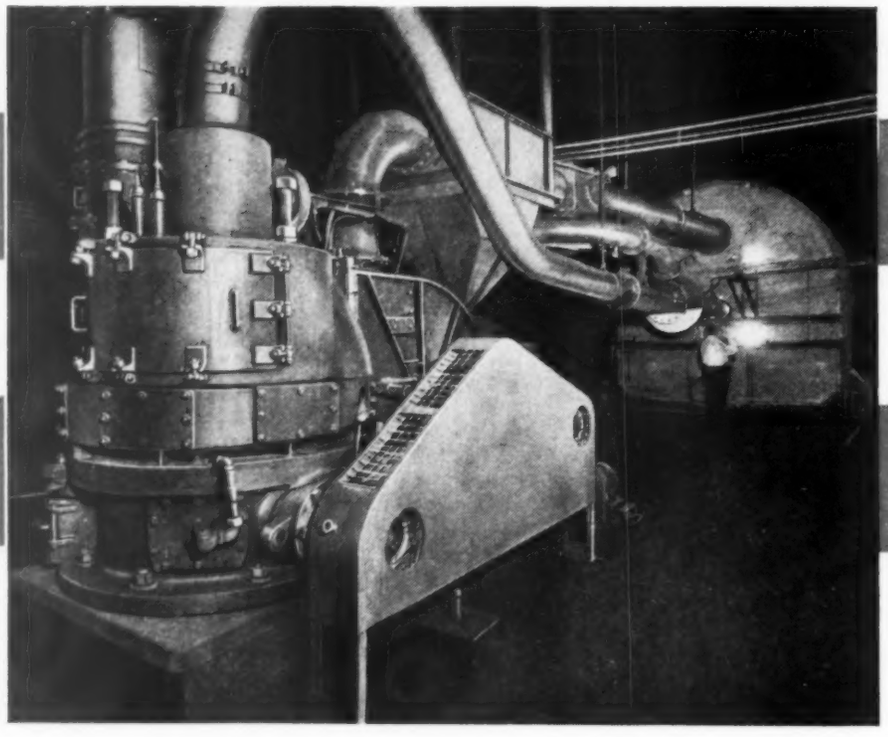
Here are kilns so instrumentalized that the fuel-primary air ratio, primary air-secondary air ratio and other factors are held in balance automatically and so arranged that all the variables relating to firing may automatically compensate should any one variable be changed. Even the secondary preheated air is free from dust through employment of tubular cooling equipment that keeps cooling air from contact with the lime.

All major classes of machinery have undergone redesign. Crushers, for instance, have been speeded up and the functions of primary and secondary reduction are being performed in single units. Portable aggregates plants, which may figure importantly in the operations of stationary, commercial plants as long-deferred major construction gains momentum, are capable of enormous tonnages per unit of manpower and have been engineered for increasingly greater flexibility in the production of various aggregates sizes.

Apparently, new machinery designs for all plant processing have considered maintenance which is extremely important to a group of industries that must process some of the toughest and most abrasive materials known.

Bror Nordberg

B&W Direct-Firing System



7 Features - - -
that give High kiln firing economy

Simple — dependable — economical, the B&W Direct-Firing System has demonstrated the following cost-saving features in existing installations that represent a majority of all direct-fired cement kilns now in service.

1. Ability to handle high-moisture coals.
2. Consistently high fineness and uniform delivery of coals.
3. One-Point control of fuel-air ratio and volume.
4. Ball-bearing principle of grinding.
5. Uniform Kiln temperature.
6. Minimum floor space.
7. Reliable operation — low maintenance.

FOR CEMENT PLANTS — Pulverized-Coal Direct-Firing System . . . Pulverizers for Grinding Rock Products and Ores . . . Heat and Abrasion Resistant Alloy Castings . . . Stationary Boilers and Component Equipment . . . Waste-Heat Boilers . . . Fuel Burning Equipment . . . Refractories . . . Seamless & Welded Tubes.

★ ★ ★

OTHER B&W PRODUCTS — Marine Boilers . . . Pressure Vessels . . . Special Process Equipment . . . Chemical Recovery Units.

BABCOCK & WILCOX

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Rocky's NOTES

Nathan C. Rockwood

Genuine "Red Menace" to Our Supremacy

SO CONSTANTLY REMINDED are we by radio news commentators, journalists and newspapers of our industrial supremacy, we accept it as a premise here at the start. We could argue that this claim or boast is based on production of many things which do not contribute to human happiness or well-being, such for example as instruments for war; but for the moment let us admit that the position of the United States of America in a badly confused world is supreme, for various reasons which have been recounted so often we are all familiar with them—our republican form of government, our industrial system of free competitive enterprise, our "inexhaustible" natural resources.

We will discuss the last mentioned; for, although a few voices have been crying in the wilderness, the great majority of the American people still enjoy the delusion that "America the Bountiful" has inexhaustible stores of natural resources. The subject is a big one; we are concerned therefore only with one of those natural resources—our cultivatable farm lands —the soil from which comes practically everything necessary to support life. When our problem thus simmers down to maintaining a population with enough health, stamina, and aggressiveness to hold our industrial supremacy, agricultural soil resources are of first importance, irrespective of the remaining natural resources of petroleum, coal, metals, etc.

As a people we seem to be suffering from war psychosis on the subject of the "Red Menace" to our world supremacy. Publicists, be they radio commentators, newspaper editors, military or statesmen, render no public service, in our opinion, by this constant agitation of a subject which is getting so much on the public's nerves that we are becoming psychopathic, but since apparently, we must endure it, let those intelligent enough to understand, turn this agitation toward an objective that will generate a healthful rather than a morbid reaction in the public mind—a way in which we can prepare for our own well-being as well as for future war.

After all, there is far less to fear from the conflict of the political ideologies involved than in matching the ultimate resources in men, brains, aggressiveness, progressiveness and ambitions. These resources, intangible as well as tangible, stem primarily from the soil and the type of mankind it produces, as we well know from experience in America. They are only secondarily affected by forms of political governments, because these governments eventually must reflect the native human qualities mentioned. Hence, we see not so much reason for being alarmed by the political phases of the Red Menace, as cause for uneasiness in the fact that we are still criminally wasting our soil resources, while our red competitor is just beginning to develop his.

Every agronomist and many intelligent farmers know that for the last several years we have been "mining" our soils, not cultivating them. Aside from the actual erosion of the soil by water and wind, which alone accounts for tremendous annual losses, we are, by overcropping, continuously robbing our soils of a variety of essential minerals. A few of the most obvious of these are being partially replaced by applications of limestone, potash, phosphate, fertilizers and farm-yard manure, but there is need for replacement of many "trace" minerals, which is at present entirely neglected by those who cultivate the soil and on whom our future health and very existence ultimately depend.

Importance of "Trace" Minerals in Soils

So, we are back on a familiar theme, stimulated this time by perusal of a new book, "Trace Elements in Plants and Animals," by Dr. Walter Stiles.* The author defines "trace elements" as "micro-nutrients and minor elements, terms applied to a number of chemical elements which are essential for the lives of plants and animals, but which are required in extremely small quantities" It is because they are required in such extremely small quantities that their absence in the nutrients of plants and animals are seldom noticed until strange things begin to happen in the life cycles of these plants and animals.

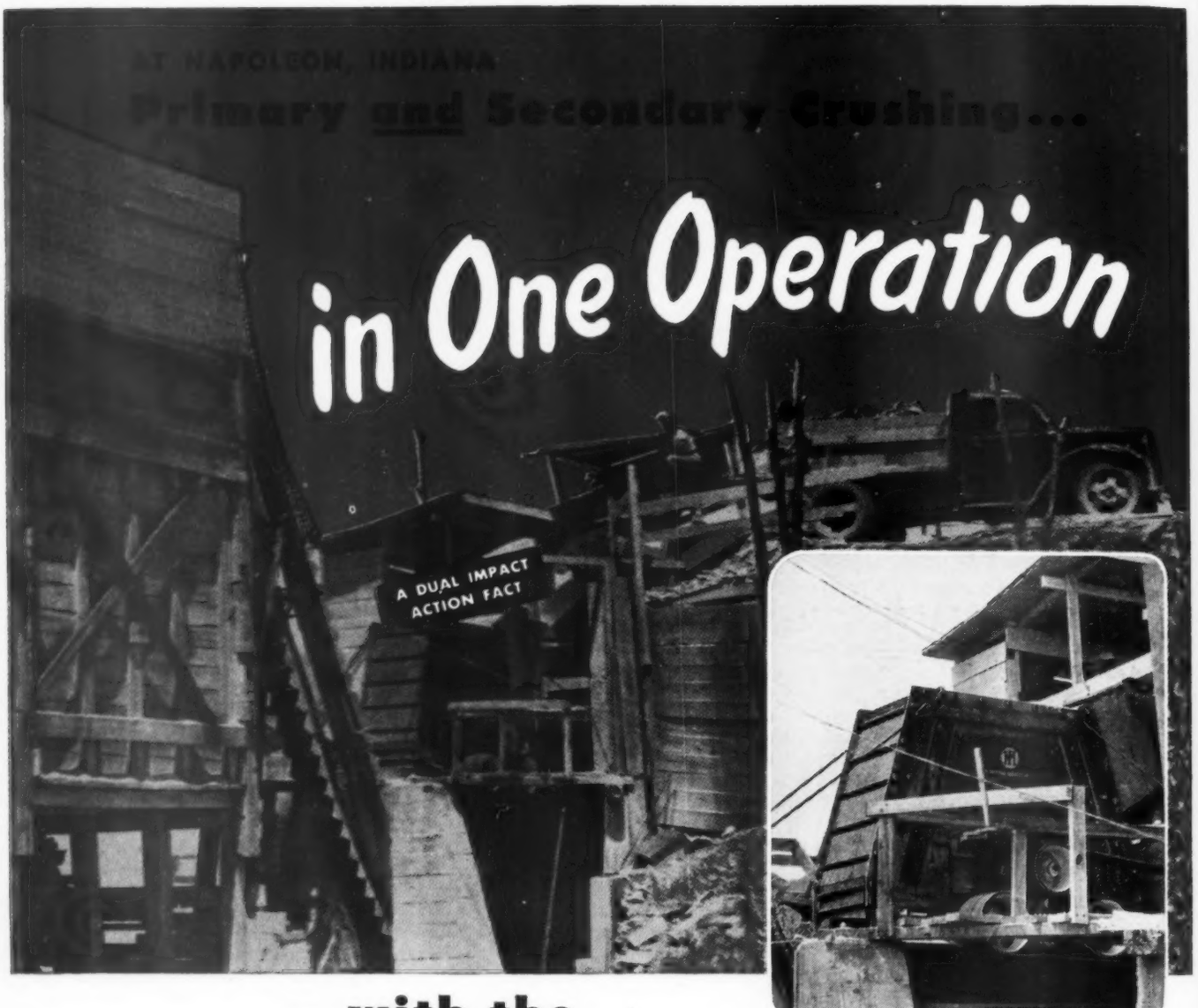
To quote from Dr. Stiles' preface again: "The role of the trace elements in organisms is, in the first place, a matter for the plant or animal physiologist, but as deficiency or excess in the supply of the various trace elements may lead to a diseased condition of the plant or animal with serious economic consequences, the trace elements are also of interest to the plant pathologist, the veterinary surgeon, the agriculturist and horticulturist. (He should have mentioned the physician and surgeon—Editor.) Indeed as regards plants, at any rate, much more is definitely known of the plant pathological aspect of trace elements than of their physiological functions." Translated, this means that we know more about the effects of trace minerals on the diseases of plants than we do about their useful or necessary functions in the plant, animal or human organisms. Nevertheless we know enough to realize that mineral deficiencies in our diet may be the cause of many very serious human complaints.

Trace Elements

The book before us is mainly concerned with a resumé of present knowledge, and the techniques employed to study the effects of these rare elements on plants. The experimental methods are too involved and require too much knowledge of chemistry for the layman, because it is very difficult to determine such small traces and to make solutions which contain only the particular elements desired for a test. Nitrogen, sulphur, phosphorous, potassium, calcium, magnesium and iron, are not considered here as trace elements because they have long been recognized as essential plant nutrients and occur in more than trace quantities in any fertile soil. The better known trace elements are manganese, zinc, boron, copper, molybdenum, tungsten, fluorine, arsenic, lead, selenium, cobalt, nickel, lithium, etc., among the minerals.

Returning to our opening theme, it is better for the present to concentrate our national anxiety over the Red Menace on the untapped virgin soils of our economic competitor, and this prospect of a future well-fed, vigorous, ambitious race, while our own soils are being mined out and will, unless we are intelligent, eventually result in puny, unhealthy plants, animals and men. Nature originally was kind to us in soil, climate and environment. We developed an aggressive, ambitious race of mankind that devised a scheme of government and of competitive enterprise to exploit these natural resources very rapidly with little thought for the generations to follow. We have great faith in the efficiency of our methods of getting the most out of the good things in nature, but we should not discount too greatly the methods employed elsewhere to accomplish the same purpose.

*Cambridge, England: The University Press; New York, The Macmillan Co. 190 pp., price $3.00.



...with the New Holland Model 3030 Breaker

The Napoleon Lime Industry of Indiana is reducing extra-hard, run of the quarry rock from minus 30" to 50% ¾ down stone and 50% lime dust *in one operation* . . . at the rate of 75 tons an hour with their New Holland Model 3030 Breaker. In producing the first 50,000 tons the impeller bars, which have four striking surfaces, were turned just once. This promises a life expectancy of 150,000 to 200,000 tons . . . exceptional for this material.

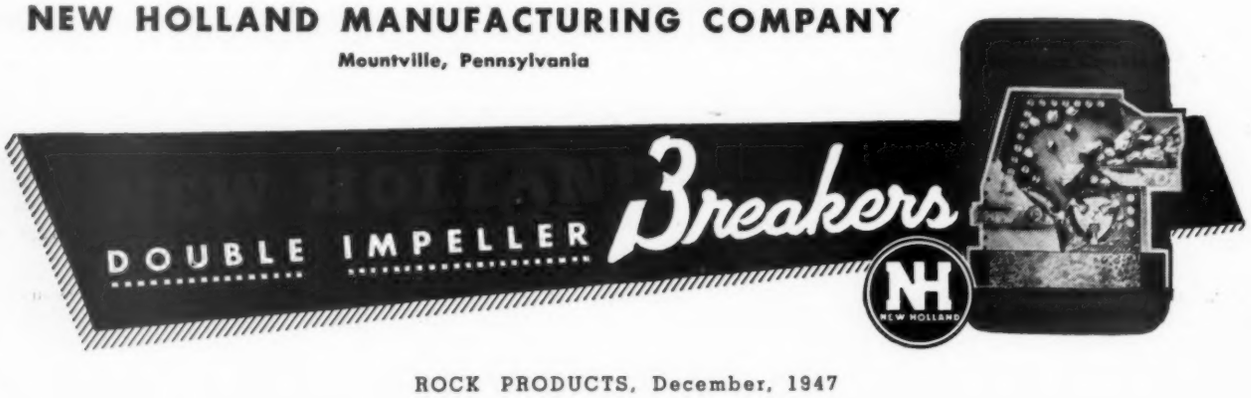
Robert McClanahan, partner in the Industry, says, "The machine seems to be holding up in good shape and so far we are very much satisfied with it."

Primary and secondary crushing with a New Holland Model 3030 Breaker reduces equipment investment . . . cuts handling costs . . . gives more tons for each production dollar. Bigger profits are the result. Write today for the illustrated catalog explaining Dual Impact Action Breakers in detail.

Ask your distributor to show you "The New Stone Age," a color film of the 3030 Breaker in action.

NEW HOLLAND MANUFACTURING COMPANY

Mountville, Pennsylvania



the *Personal Side* of the news

P.C.A. Official Retires

WILLIAM M. KINNEY, vice-president for promotion, Portland Cement Association, Chicago, Ill., has retired from the Association under the retirement plan. Mr. Kinney has been connected with the cement industry practically all of his business life. Shortly after graduation from Lewis Institute as a mechanical engineer, he joined the staff of the Universal Portland Cement Company in 1907. In 1914 he was appointed inspecting engineer and engineer of the information bureau. In 1918 he was elected general manager and secretary of the Portland Cement Association, a position he held until 1931 when he was also elected vice-president of the Association.

William M. Kinney

HUBERT C. PERSONS, assistant advertising manager, Portland Cement Association, has been appointed manager of the public relations bureau. Mr. Persons has been on the staff of the association's advertising and publications bureau since 1934.

MILTON E. HLAVA has been named to succeed Mr. Persons as assistant advertising manager.

Safety Award

A. J. R. CURTIS, safety director, Portland Cement Association, Chicago, Ill., has been awarded the Joseph A. Holmes medal of honor for his contributions to safety in the cement industry. The medal was presented by Dan Harrington, secretary of the Joseph A. Holmes Association and chief of the Health and Safety Branch of the U. S. Bureau of Mines, at the annual meeting of the P.C.A. in Chicago. Mr. Curtis, who has been in charge of the Portland Cement Association's accident prevention bureau since 1926, is the second person to receive this medal, and has been responsible for many innovations promoting safety in cement mills and quarries. He has introduced special studies on safety which have resulted in a 71 per cent reduction in lost-time accidents in the industry in the past 25 years. The Association's safety work includes the presentation of a safety trophy to the cement mill which operates a full calendar year without a lost-time accident.

Lehigh Promotions

C. GLEN BROWNING, sales manager of the New York office of Lehigh Portland Cement Co., Allentown, Penn., has been named vice-president and general sales manager. CHESTER S. CRAWFORD, assistant vice-president, Allentown, Penn., becomes vice-president and assistant general sales manager. HARRY A. ZELIFF, assistant plant manager at the Fordwick, Va., plant has been appointed plant manager to succeed Henry A. Johnson who has retired. JOHN J. CLOUS, assistant traffic manager at Allentown for the past 10 years, has been named traffic manager. E. S. GUBERNATOR, formerly general traffic manager, has retired after 32 years of service.

Mr. Zeliff served for a while in the research laboratory and then became field man in the chemical department. In 1943, he was appointed chemist at Birmingham, where he was later promoted to assistant superintendent and supervising chemist. For the past year, he has been assistant plant manager at Fordwick.

Mr. Johnson first went to Fordwick in 1907 as timekeeper for a construction company rebuilding the powerhouse. The plant was then owned by the Virginia Portland Cement Co. On completion of the construction work, he was employed by the cement company until 1915. At that time, he accepted a position with the Atlas Portland Cement Co. at Northampton, Penn. When the Fordwick plant was purchased by Lehigh, Mr. Johnson returned to Fordwick in 1918 as superintendent.

Harry A. Zeliff

Mr. Gubernator, who has retired, was traffic manager of the Iola Portland Cement Co., Iola, Kans., when that company was purchased by Lehigh. He became successively assistant traffic manager and traffic manager in Chicago and was transferred to Allentown in 1926.

Awarded Certificate

ALLAN B. SUNDERLAND, president, Ash Grove Lime and Portland Cement Co., Kansas City, Mo., recently received on behalf of his company a Certificate of Public Service from Brand Names Foundation, for his company's "Ash Grove" Cement trade mark. This award is made to concerns using a brand name for 50 or more consecutive years. Sixty brand names, representing a wide cross-section of American industry, were awarded certificates. The award was made by Henry Apt, president of Brand Names Foundation, at a dinner sponsored by the Advertising Club of St. Louis.

Marquette Appointment

MATHIAS N. QUINT has been appointed assistant to H. C. Shields, division sales manager at the St. Louis, Mo., office of the Marquette Cement Manufacturing Co., Chicago, Ill. He succeeds K. P. Hackmann who has resigned to enter the service of the Federal Bureau of Investigation. Mr. Quint was formerly a member of the sales staff of the Wheeling Corrugating Metal Co., St. Louis, Mo.

Named Superintendent

LEE PURTILL who has been connected with the Granite Rock Co., Watsonville, Calif., since 1924, has been appointed superintendent of quarry and plants. Mr. Purtill was co-designer of the outstanding electrical control systems installed in the crushing and screening plants built by the company. He is an asociate member of the American Institute of Electrical Engineers.

Production Manager

PHILIP G. DEUCHLER, formerly works manager of El Rey Products Co., Celotex roofing manufacturing subsidiary, Los Angeles, Calif., has been appointed production manager of the roofing division of The Celotex Corp., Chicago, Ill.

Australian Inspects World's Cement Plants

W. ST. B. MORE, general manager, The South Australia Cement Co., Ltd., Brighton, recently visited the offices of ROCK PRODUCTS while passing through Chicago on the last lap of a five-month

W. St. B. More

trip inspecting western hemisphere cement plants. The trip was undertaken to gain ideas on latest equipment and methods in cement manufacture from quarrying to final packaging so as to be able to incorporate them in the company's projected plant at Angaston, So. Australia.

Of one million barrel capacity, the new mill is expected to be of the wet process type, depending on the availability of water. It will be built around the latest in equipment, including a dust collection system. In the words of Mr. More: "Simplicity is the keynote in modern cement mill and quarry operation."

Mr. More's trip took him to South Africa, England, Holland, Belgium, Denmark, Sweden, and across the United States.

Traveler

LOUIS WARE, president of the International Minerals and Chemical Corp., Chicago, Ill., with Mrs. Ware, went to Europe last summer to confer with leading users of phosphate rock in Sweden, Norway, Denmark, the Netherlands, Belgium, Switzerland, France and Great Britain.

Named Vice President

FRED KNISLEY, a veteran of 25 years' service with Tamms Silica Company, Chicago, Ill., has been appointed vice-president in charge of the flooring division. He was also named vice-president of the foundry division. Mr. Knisley has played an important part in the development and merchandising of several well known products for the flooring industry such as Floorstone, Wallstone, Lindex and Silatex. A new waterproofing material known as Agraseal is the latest development by this company.

Chief Engineer

FREMONT E. WOOD, formerly associated with the California Institute of Technology, has accepted the position of chief engineer and mechanical-electrical superintendent of the Sigurd, Utah, plant of the Western Gypsum Co., Salt Lake City, Utah. Mr. Wood had previously served with Basic Magnesium, Inc., Minas de Matahambre, and the Cuban American Manganese Company.

30th Anniversary

ALEXANDER FOSTER, JR., vice-president in charge of operations, Warner Co., Philadelphia, Penn., has completed 30 years of continuous service with the company.

Rancheros Visitadores

JOHN GREGG and QUINT W. BEST, vice-president of Consolidated Rock Products Co., Los Angeles, Calif., are full-fledged members of the Rancheros Visitadores of Santa Barbara County, an internationally known organization of about 300 horsemen which each year rides from Santa Barbara into the heart of the Santa Ynez Mountains. Los Rancheros means "The Visiting Ranchers," and goes back to the days when California was divided into about 50 great ranchos, owned by the fabulous Californios or Dons.

John Gregg, left, and Quint Best in Rancheros regalia

OBITUARIES

GEORGE P. HORN, superintendent of Cementos Guadalajara, S. A., Guadalajara, Jalisco, Mexico, died August 23 in Fort Atkinson, Wis. Before going to Mexico four years ago, Mr. Horn was chief chemist at the Longhorn Portland Cement Co., San Antonio, Texas, for 17 years. Prior to that he was associated for 9 years with the Alamo Portland Cement Co., San Antonio. Mr. Horn had been connected with the cement industry for 37 years, serving previously with Universal Atlas Cement Co. and Lehigh Portland Cement Co.

E. E. HICKOK, who had been associated with A. Leschen & Sons Rope Co., St. Louis, Mo., for the last 44 years, was killed in a hit and run accident on October 9 in Denver, Colo., where he had been living since 1942. During his long service with the company Mr. Hickok sold wire rope in the states of Iowa, Minnesota, Wisconsin and Michigan.

JOSEPH A. TOBIN, owner of the American Rock Crusher Co., Kansas City, Mo., died October 16 at the age of 53. Mr. Tobin had been in the contracting business for 23 years. He was owner or principal stockholder of the Ready Mixed Concrete Co., J. A. Tobin Construction Co., Union Road and Asphalt Co., and the Rosedale Development Co.

JAMES W. SAUNDERS, retired concrete block manufacturer, LaPlata, Mo., died recently at the age of 78. Mr. Saunders and his father had established the block business in 1910.

EDWARD J. GREGG, manager of the Seattle, Wash., plant of Bemis Bro. Bag Co., St. Louis, Mo., passed away recently. He was 53 years of age and had been associated with the company for over 35 years.

CHRISTIAN L. CARLSEN, president of the Chicago Dunbrick Co., Chicago, Ill., passed away recently. He was 64 years old.

MALCOLM WATKINS, superintendent of the Mott St. plant of Marquette Cement Manufacturing Co., St. Louis, Mo., died recently at the age of 41.

CLAUDE J. BRADLEY, cement salesman of Brooklyn, N. Y., died October 12 after a long illness. He was 60 years old.

THOMAS C. G. KEMP, owner of the Kemp Granite Co., Hornell, N. Y., died recently at the age of 84.

ROGER E. VERNIA, former president of the Hoosier Lime Co., Salem, Ind., passed away suddenly at his home on October 26. He was 62 years of age.

ISAAC DOUGHTEN, retired head of the Port Deposit Co. of Maryland, died recently at the age of 65.

SAMUEL W. TRAYLOR, SR., chairman of the board of the Traylor Engineering and Manufacturing Co., Allentown, Penn., passed away November 12 at his home in Florida, where he had been spending his winters for the past ten years. He was 79 years old and had been in good health until he suffered a heart attack the day before his death. His son, S. W. Traylor, Jr., is vice-president of the company. Born in New Waverly, Texas, Mr. Traylor helped in his father's blacksmith and wagon shop, saw mill, grain mill and cotton gin until the age of 16, when he left to seek his fortune elsewhere. He became a carpenter in New Birmingham and learned the art of bricklaying. In 1887 he supervised the installation of an electric light plant in Monterey, Mexico, and soon thereafter started on the erection of a smelter plant in Mexico. It was about this time that he enrolled at Kansas university to study the theory of mining and metallurgy, and subsequently became associated with the Colorado Iron Works, supervising the testing laboratory and developing the manufacture of mining machinery, becoming sales engineer. In 1900 he left Colorado and opened an office of his own in New York City, as consulting mining engineer. A year later he moved to Allentown and purchased a vacant foundry building on the site of the present Traylor Engineering and Manufacturing Co. Mr. Traylor also was a director of the Cement Gun Co. of Allentown.

Samuel W. Traylor, Sr.

PCA Conducts Seminar

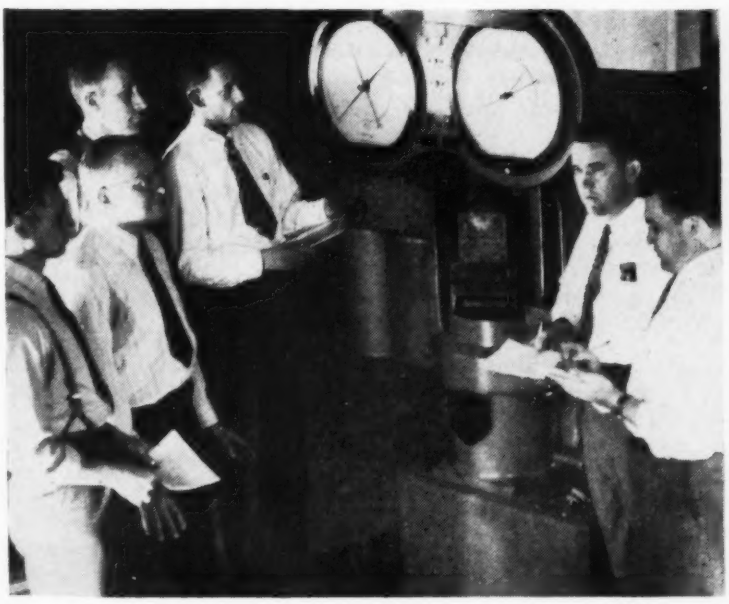
PORTLAND CEMENT ASSOCIATION is conducting the first of what will be a continuing series of seminars at its headquarters in Chicago. The avowed purpose of the course is to "indoctrinate students with the broad-gauge policies of the Portland Cement Association." Since the PCA is an association or representative of all member portland cement mills in the United States, the purpose of the course becomes broadened to include not only the manufacture and use of portland cement, but also merchandising and public education regarding benefits to be derived from its use.

The 13-week course is under the direction of John A. Ruhling, manager of technical personnel for PCA. Prior to Mr. Ruhling's joining the Chicago office in 1943, he spent nine years as field representative for the association in the Milwaukee, Wis., area. During these years he spent considerable time in promotion of highways, sewage plants, and housing projects. He first joined the Chicago office as assistant manager of the Cement Products Bureau.

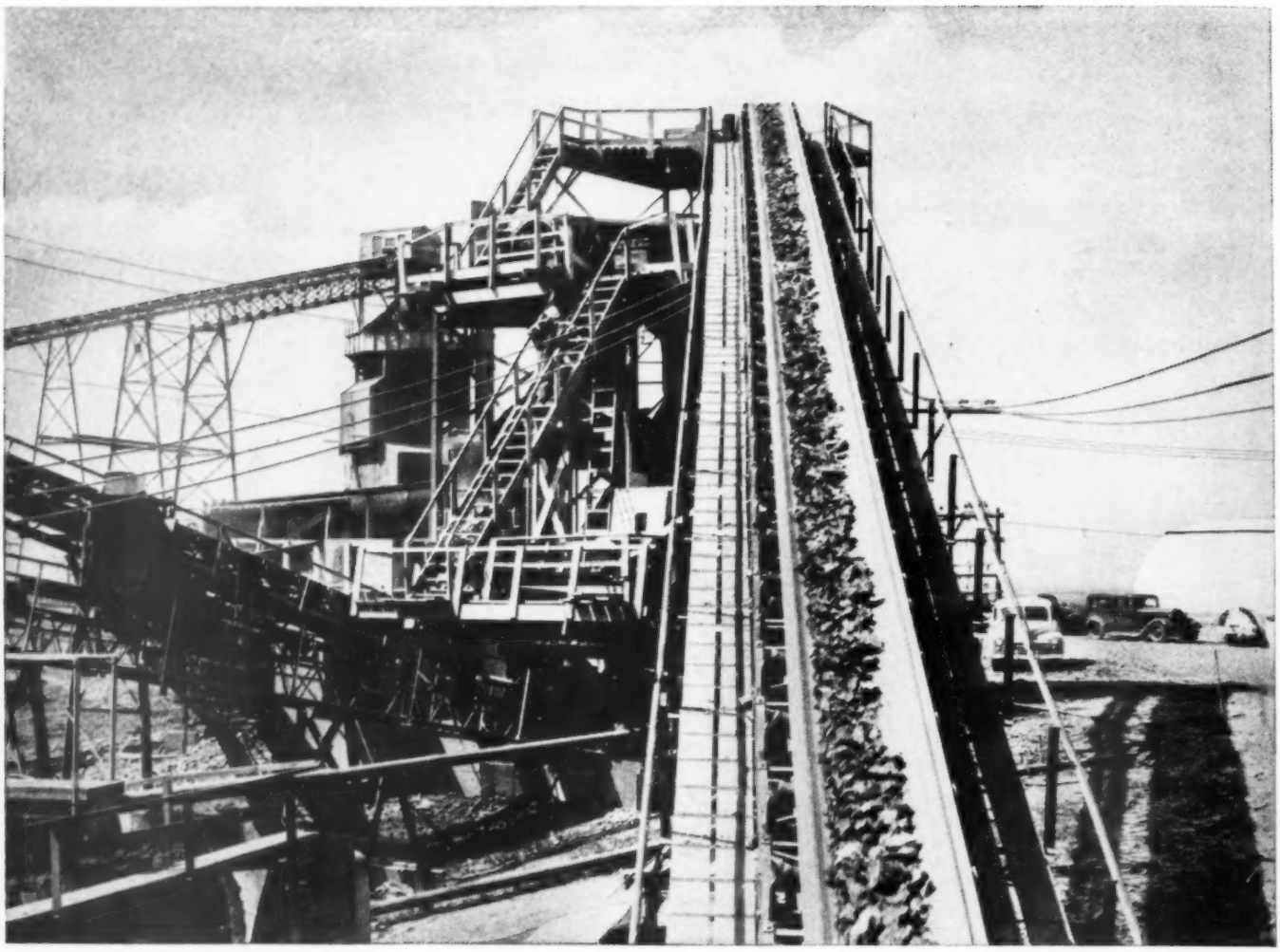
Students attending the first seminar are composed half of member company representatives and half of new additions to the PCA staff. The seminar is conducted in much the same way as a similar course in an engineering school, with classroom study, chemical and physical laboratory work, design problems, field trips, oral quizzes and written examinations.

A rough outline of the course follows: background and history of portland cement in Europe in general and in the United States in particular. A study of cements other than portland, and classroom study of the manufacture of portland cement. A complete and thorough history of the association, including a study of its organization and policies. Classroom study in design and control of concrete mixes coupled with actual physical laboratory work to determine compressive and flexural strengths of concrete made with various cement contents, type of aggregate, and systems of grading. This last mentioned phase of the course is conducted in the extensive PCA testing laboratory with methods set up and approved by the American Society for Testing Materials.

The course also includes field trips to the association "farm" outside Chicago where extensive weathering and use tests are run, and to nearby public and private construction jobs.



Two groups of Portland Cement Association district engineers and headquarter's staff personnel in the laboratory. John A. Ruhling, manager of technical personnel, may be seen second, to the left



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LABOR RELATIONS TRENDS

Experience Under Taft-Hartley Act

By NATHAN C. ROCKWOOD

BOTH management and unions are showing a disposition to make the best of the new Labor-Management Relations Act—with some much publicized exceptions. The National Labor Relations Board, too, has been conciliatory in the cases of some few top national union officials "too proud" to file affidavits (that they are not communists) by over-ruling its general counsel in a decision to the effect that the law does not require this. It will be sufficient, unless the courts rule otherwise, for only the officers of the union involved to file these affidavits. The decision of the Board and the acquiescence of the general counsel remove technicalities so that the law may be put into practice as expeditiously as possible.

Of the first 407 cases filed under the new law, charging unfair labor practices, 11 were filed by A.F. of L. unions, 4 by C.I.O. unions, 12 by unaffiliated unions, 34 by employers, 8 by employer associations and the remaining 333 by individuals. Of those filed by individuals, all but 28 were charges against employers — 168 by members of C.I.O. unions, 68 by A.F. of L. members, 12 by members of unaffiliated unions and 83 by individuals whose union membership was unknown. Petitions received in representation cases numbered 204, of which 58 were filed by individuals asking for decertification of unions. A.F. of L. unions filed 43 of the total; C.I.O. unions 7; unaffiliated unions 56 and individuals, including the 58 mentioned, 62.

Of the 72 charges of unfair labor practices filed against unions 25 were cases of secondary boycotts and 5 of jurisdictional disputes between unions. In none of these cases was an A.F. of L. or a C.I.O. union the complainant. But A.F. of L. and C.I.O. unions are complainants in 15 cases against employers. During most of the period covered by these statistics many unions purposely avoided filing because of the N.L.R.B.'s general counsel's ruling that their national officers must make affidavits. This also accounts, it is presumed, for the relatively small number of representation cases filed, which were 33 per cent of the total compared with 74 per cent in June, the last month of operation under the Wagner Act.

The chief holdout is the International Typographical Union (A.F. of L.) whose locals are in controversy in several cities because of the union's unwillingness to make contracts. It is now prohibited by the law to make closed-shop agreements with employers as it was done by the I.T.U. for many years. The locals, acting under instructions of the International officers, offer to work only under terms which they alone have drawn up, the keystone of which is a clause permitting members of the union to quit if asked to work with non-union employes, thus in effect continuing closed-shop conditions. The employers contend the law does not permit them to accept such a condition, and charge the local unions with refusal to bargain, which is a violation of the law. The controversy is headed for the courts and probably for the U. S. Supreme Court by the shortest possible route, for the issue is fundamental.

The I.T.U. attorneys are attempting to make an issue of constitutional law out of the case by arguments before the N.L.R.B. trial examiner that (1) the L.-M.R.A. violates the Fifth Amendment to the Constitution by depriving the union of the right to contract for the terms it is demanding (the Fifth Amendment is the one guaranteeing the right of citizens not to be tried for crime unless on a presentment or an indictment of a grand jury); (2) the L.-M.R.A. violates the First and Fifth Amendments by conditioning federal rights and access to governmental agencies upon an arbitrary and discriminatory classification based upon political beliefs (the First Amendment is the one which guarantees freedom of religion, of speech and press, of assembly and petition); (3) violates the Thirteenth Amendment by imposing involuntary servitude in that it denies employes the right to cease work or to refuse to sell their labor upon such terms and conditions as they deem fair and reasonable (the Thirteenth Amendment is the one adopted at the close of the Civil War prohibiting negro slavery). The reader, as a layman, is as good a judge of the strength of their case as the present reporter; and it is one that should arouse the interest of every employer, whether in the printing business or some other.

Union Accused of Coercion

The N.L.R.B. also has now before it the first case which will test the law's prohibition of the use of coercion on nonunion employes. A complaint was issued by a regional director of the Board against the United Shoe Workers (C.I.O. union) which called a strike against the Perry-Norvell Co., Huntington, W. Va. The strike resulted in a shutdown, the alleged purpose being to force the employes to join up, abandoning their present local Boot and Shoe Workers (A.F. of L.)—a clear case of a C.I.O. raid on its rival. In addition to the strike action the C.I.O. is accused of threats of discriminatory treatment of its victims should it win.

The first case in which the general counsel of the N.L.R.B. sought a court injunction to stop a secondary boycott involves a local of the United Mine Workers (A.F. of L.). The court was asked to forbid the union and its agents from preventing employes of a construction company doing work for a coal mining company. The union's purpose was to compel the mine company to accept the miners' union as bargaining agent, although it had not been so certified. The unfair labor practices sought to be enjoined are: (1) engaging in a secondary boycott; (2) engaging in organizational picketing; (3) coercing employes of the mine company in the exercise of their rights not to join a labor union. The request for an injunction to stop a secondary boycott is mandatory under Section 8(b)(4) of the L.-M.R.A.

In a case involving a local of the United Carpenters (A.F. of L.) in Chattanooga, Tenn., the U. S. District Court refused to grant the N.L.R.B. an injunction against a secondary boycott on the grounds that the boycott was instituted before the injunction provisions of the law became effective. The main facts were these: A building specialties retailer, at the owner's request, started placing floors in a private residence with labor which did not belong to the carpenters' union. The union carpenters were pulled off the job and they established picket lines to prevent the flooring dealer's workers from continuing. However, the carpenters withdrew altogether on August 21, the last day before the secondary boycott provisions of the law could be enforced. The purpose of the injunction, which was sought on the complaint of the flooring dealer, seems to have been chiefly to prevent a repetition of the boycott, but the U. S. District Court upheld the union's contention that it was not violating the law at the time it became effective.

Must Have Bona Fide Contracts

Robert N. Denham, general counsel for the N.L.R.B., has answered the tactics of the International Typographical Union and any others that plan to imitate it, without mentioning any names. In his address, October 24, to the Confederated Unions of America, at Chicago, Ill., he said: "Collective bargaining would be an idle term if it did not contemplate an ultimate agreement in written form and signed by the parties if either party should desire that formality. To be sure, counter-proposals are not mandatory, but when two parties undertake to explore an area in which they are seeking a common meeting ground, inevitably there must be many departures from the original point of view and concessions on both sides looking to the consummation of an agreement. The material part of this provision is that, not only must the employer do this, but the bargaining representative of the employes is under an equal obligation and, as in

(Continued on page 151)

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INDUSTRY *News*

All-Steel Barges To Transport Aggregate

THE USE OF all-steel barges in the transportation of aggregate to company yards and various river markets has been cited by the Warner Co. of Philadelphia, Penn., as a definite advantage. According to Alexander Foster, Jr., vice-president of the company, greater efficiency has been achieved with the steel barges as they have a greater carrying capacity and lower maintenance cost and require less repairs than the original wooden barges.

The company has been replacing its wooden barges with steel barges since 1923, its present fleet consisting of 37 all-steel, 1000-ton flush-deck barges; three 700-ton steel barges, and 27 wooden barges of varying capacity, ranging from 600 to 750 tons. The steel barges were designed and built by Dravo Corporation, Pittsburgh, in collaboration with Warner engineers.

N.L.A. Convention

THE OPERATING DIVISION of the National Lime Association will hold its next meeting January 29-30 at the Gibson Hotel in Cincinnati, Ohio, enabling representatives to see the exhibit of the Manufacturers' Division of the National Crushed Stone Association which also is holding its convention that week in Cincinnati, at the Netherland Plaza Hotel. The N.L.A. meeting will be directed by Bolton L. Corson, G. & W. H. Corson, Inc., chairman of the Operating Division, and H. M. Beatty, Kelley Island Lime and Transport Co., chairman of the program committee.

New Research Institute

SOUTHWEST RESEARCH INSTITUTE, San Antonio, Texas, a non-profit scientific organization designed to help Southwestern industry solve its technological problems, has opened its laboratories and already has contracted for several projects.

The Institute, dedicated in September by its trustees and Tom Slick, San Antonio oil man who endowed it for more than $1,000,000, will conduct industrial research on a fee basis giving sponsoring manufacturers patent rights on all discoveries.

Dust Ordinance

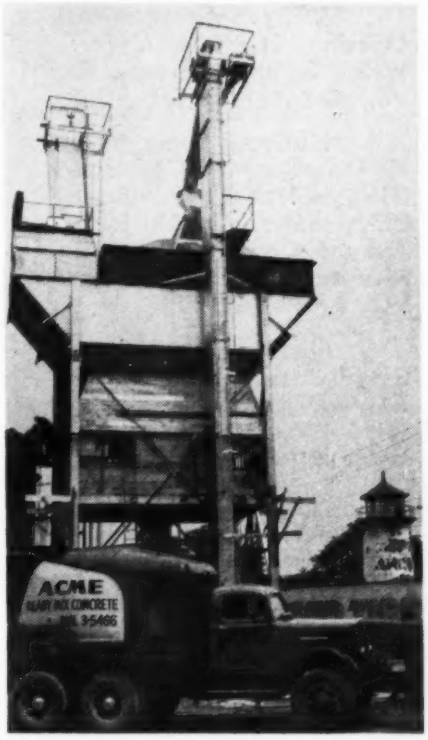
CEMENT COMPANIES in the Osborn, Ohio, area have been confronted with the problem of further elimination of dust. The city council of Osborn has been under pressure to pass an ordinance requiring The Universal Atlas Cement Co., and Southwestern Portland Cement Co., to install additional dust collecting equipment.

Reorganize Limestone Co.

GOUVERNEUR LIMESTONE CO., Gouverneur, N. Y., has been purchased by John Balducci from Harry H. Hodgkin, and is now in the production of agricultural lime and crushed stone after an idleness of three years. Mr. Balducci, who was affiliated with Worlock Stone Co., Canastota, N. Y., for the past 25 years, plans to revamp the entire plant in an effort to double the prewar production rate.

Building Ready Mix Plant

ACME READY MIXED CONCRETE CO., Rockford, Ill., has been constructing a new batching plant which will provide much greater capacity than the older plant. Overhead aggregate bins will have a total capacity of 176-cu. yd., and the cement bin will hold 428 bbl. Concrete batching capacity of the new plant is scheduled to be 500-cu. yd. per 8-hr. day. Two new 4-cu. yd. Jaeger mixer trucks on White chassis have been added.



One of two new 4-cu. yd. mixer trucks recently placed in service

Shortage of Cement For Small Orders

BUILDERS in the Columbus, Ohio, area seeking to lay sidewalks or anchor fence posts before winter sets in received little comfort from the statement that the tight cement situation, making it virtually impossible to buy one or two sacks of cement or a similar small order of ready mixed concrete in the area, was only temporary.

Spokesmen for a national cement manufacturing concern said the situation was due chiefly to lack of railroad cars to haul cement from factory to dealer, and the unprecedented demand resulting from recent ideal building weather. Dealers are having trouble filling regular orders, they said, and when they do succeed in getting a shipment, parcel it out to regular contractors first.

Reorganize Aggregate Plant

FEATHERLITE CORPORATION, formerly known as the Erath Co., Strawn, Texas, has started expansion of facilities, including the establishment of a new plant. The Corporation, which manufactures Featherlite expanded shale aggregate averaging 1200 lb. per cu. yd., adopted the expansion program and new name at a recent stockholders' meeting when H. C. Vandaveer, Erath president, was made chairman of the board; Jack Frost, president; Alex T. Mickle, executive vice-president; Wilburn Williams, vice-president and treasurer; Miss Carolyn Roberts, secretary; and Carl Kilborn, assistant secretary-treasurer. J. R. Stuart, mayor of Strawn, was elected to the board of directors.

$400,000 Rock Wool Plant

AMERICAN ROCK WOOL CO., Wabash, Ind., has awarded a contract to the Rust Engineering Co., Pittsburgh, Penn., and Birmingham, Ala., for design and construction of a plant in Birmingham. Work contemplated will involve an expenditure of approximately $400,000, with plant operations scheduled for July, 1948.

Change Paving Plans

BECAUSE of "ripples" and "waves" in the surface of comparatively new asphalt roads at Houston, Tex., some of 58 roads, originally planned for asphalt surfacing under a recently approved $9,000,000 county road and bridge bond issue, may be paved with concrete instead.

Limit Quarry Blasting

QUARRYING OPERATIONS of Fuller Co., Wauwatosa, Wis., have been restricted by a new city ordinance that regulates blasting to one hour in the morning and one in the afternoon every day except Sundays and holidays. The new ordinance also prohibits blasting closer than 50 ft. to a street or 200 ft. to any dwelling. The first draft of the ordinance set the distance from any dwelling at 300 ft., but when the company pointed out to the common council that this restriction would prevent over half the available rock being removed from the site, the clause was rewritten.

Buys Government Plant

GIANT PORTLAND CEMENT CO., Phildelphia, Penn., has signed a contract with the WAA for purchase of a Government-owned alumina plant at Harleyville, S. C. The plant will be converted to a cement mill with an annual capacity of approximately 800,000 bbls. Production is expected to begin the latter part of 1948.

Coming Conventions

American Concrete Pipe Association, 40th Annual Convention, Hotel Roosevelt, New Orleans, La., March 11-13, 1948.

American Concrete Institute, 44th Annual Convention, Shirley-Savoy Hotel, Denver, Colo, February 23-26, 1948.

American Road Builders' Association, 45th Annual Convention, Washington, D. C., January 26-28, 1948.

American Road Builders' Association, Exposition of new Construction Equipment, Soldier Field, Chicago, Ill., July 16-24, 1948.

American Society for Testing Materials, Annual Meeting and Exhibit of Testing Apparatus and Related Equipment, Book - Cadillac Hotel, Detroit, Mich., June 21-25, 1948.

American Society for Testing Materials, Committee Week and Spring Meeting, Washington, D. C., March 1-5, 1948.

Agricultural Limestone Division of National Crushed Stone Association, 3rd Annual Convention, Netherland Plaza, Cincinnati, Ohio, January 29-30, 1948.

National Agricultural Limestone Association, 3rd Annual Convention, Hotel Statler, Washington, D. C., January 14-15, 1948.

National Concrete Masonry Association, Annual Meeting, Hotel New Yorker, New York, N. Y., March 1-3, 1948.

National Crushed Stone Association, 31st Annual Convention and Exposition, Netherland Plaza, Cincinnati, Ohio, January 26-28, 1948. Exposition January 26-30.

National Industrial Sand Association, Annual Meeting, The Homestead, Hot Springs, Va., May 12-14, 1948; Semi-Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., October 20-22, 1948.

National Lime Association, Operating Division, Gibson Hotel, Cincinnati, Ohio, January 29-30, 1948; Annual Convention, The Homestead, Hot Springs, Va., April 5-7, 1948.

National Sand and Gravel Association, 32nd Annual Convention, Netherland Plaza, Cincinnati, Ohio, January 20-22, 1948.

National Ready Mixed Concrete Association, 18th Annual Convention, Netherland Plaza, Cincinnati, Ohio, January 21-23, 1948.

Sand-Lime Brick Association, Convention, Roanoke Hotel, Roanoke, Va., January 26-28, 1948.

Thermo-Con Houses

ANDREW HIGGINS, INC., New Orleans, La., has placed its first "Thermo-Con" house on exhibit, stating that the number of such houses that can be offered on the national market is "limitless."

Thermo-Con is a factitious light rock, a mixture of Portland cement and certain "chemical ingredients," and forms the house—roof and walls. It is poured into a house pattern of steel forms with metal laths as its backbone.

The material is said to have the potential strength of limestone, and while it is light enough to float in water, is also firm enough to be nailed, sawed or screwed. It is vermin-proof and has a high insulating value, Andrew Higgins, Sr., states.

See No Repeal of Taft-Hartley Act

VINCENT P. AHEARN, executive secretary of the National Sand and Gravel Association, in a recent report stated that talk of repeal of the Taft-Hartley Act is sheer nonsense, and that neither this nor the next Congress will repeal or even seriously amend the law. The new legislation, he said, enacted in the public interest, imposes heavy additional obligations and restrictions on employers and is far from being a "slave labor" law.

Bentonite in Plastic

MELLON INSTITUTE, Pittsburgh, Penn., has developed a new process for producing a plastic that makes use of the silicate particles in bentonite. A chemical reaction is induced between the fine silicate particles and resin-forming organic polymers so that a copolymer of the organic resin and the mineral is formed. This new plastic is reported to be able to withstand extremely high temperatures.

Moves Office

UNITED CEMENT, LIME AND GYPSUM WORKERS INTERNATIONAL UNION, Chicago, Ill., has moved the general office to its own building at 3329 W. Washington Blvd., Chicago, Ill. William Schoenberg is general president and Toney Gallo is general secretary-treasurer.

Sell Shares in Quarry

CHESTER GRANITE QUARRIES, Chester, Mass., recently purchased by the Liberty Realty Co., headed by James Tait, Atty. James P. Moriarty, and Irving Chidsey, plans to sell shares to local residents in an effort to put the quarries back into operation as soon as possible. The quarries, which have been idle several months, were taken over by the Liberty Co. in a foreclosure sale.

New Simplified Practice Proposal Recommended

A PROPOSED Simplified Practice Recommendation for welded wire fabric reinforcement for concrete pipe has been submitted to producers, distributors and users of this material for approval, comment, or both, it has been announced by the Commodity Standards Division of the National Bureau of Standards. The proposed recommendation gives the area of longitudinal wires per linear foot of fabric, and the spacing and gauge of longitudinal and transverse wires, with sketches included.

The proposal also lists 45 styles of fabric, in place of the 311 styles which an industry survey disclosed were used, and if generally accepted, the simplified list will represent a reduction of approximately 86 per cent. It is estimated that the 45 styles will satisfy 90 per cent of demand. Mimeographed copies of the proposed recommendation may be obtained from the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.

Construct Conveyor Bridge

CONSOLIDATED ROCK PRODUCTS Co., Los Angeles, Calif., plans to construct a 100-ft. high steel stacker conveyor bridge at its Irwindale plant as a link between Irwindale pit operations and the Baldwin Park Pit. The stacker will provide a surge pile of raw feed which will permit the plant to operate several days in case of any major pit break downs.

Compressor Data

SUN OIL Co., Philadelphia 3, Penn., has issued a new illustrated bulletin entitled "Lubrication of Air Compressors and Pneumatic Tools." Contents include the history of air compression, types of modern compressors, compressor lubrication systems, notes on compressor operation, typical modern pneumatic tools, pneumatic tool lubrication, and lubrication recommendations.

Big French Gypsum Deposit

A DESCRIPTION of a gypsum deposit near Paris, France, has been released by a French manufacturer of plasterboard in an endeavor to create American interest in organizing a gypsum plasterboard company in France. Appearing in *Mineral Trade Notes*, U. S. Department of Commerce, the article stated that the total area of the deposit is 200 hectares, or 494 acres, and that ideal water, rail, and road facilities are available. The total area represents about 70 or 80 million tons of gypsum. Layers of pure green, blue, yellow and gray clay are distributed regularly through the strata on the entire surface of the deposit, and also layers of chalk (lime carbonate) could be exploited, and agricultural lime obtained. It has been calculated that there is a shortage of more than 60,000 tons of plaster needed for reconstruction in France alone, plus upkeep of private homes in addition to reconstruction needs in Germany and Italy.

Phosphate Fertilizer Exports

PHOSPHATE FERTILIZERS are the most pressing need of European countries, according to Louis Ware, president, International Minerals & Chemical Corp., who just returned from a six weeks' tour of Europe. Total United States production of phosphates this year will be in the neighborhood of 7,000,000 tons, or half the world's total. Of this amount, 5,000,000 tons will be used domestically and most of the balance will go to Canada, Mexico and South America.

Europe will receive a large share of the 5,500,000 tons produced in North Africa, but this will still not meet her needs, and Mr. Ware stated that the difference will provide a good export market for U. S. companies.

International Minerals expects to bring a new Bartow, Fla., phosphate mine into production early in 1948 with a potential output of 1,000,000 tons.

F.T.C. Cement Case To Supreme Court

AFTER winning its case in the federal appeals court, the cement industry is now faced with a final decision before the U. S. Supreme Court. The Federal Trade Commission charges 75 cement companies, members of the Cement Institute of having "acted jointly to keep prices up" by submitting identical bids.

Purchase Limestone Co.

ARKANSAS LIMESTONE PRODUCTS Co., Fayetteville, Ark., has been purchased by W. A. Childress and Sons, A. A. Childress and Jack L. Childress. The new owners plan to produce approximately four tons of chat, gravel and limestone per day, serving an area within a hundred mile radius of Fayetteville.

Enters Contracting Field

JOHN H. HANCOCK'S Cement Products Co., St. Francis, Kan., following enlargement and rearrangement of its factory for increased production, has entered the contracting field. The company also is producing a new size concrete block of greater strength.

Seek Dredging Permit

AULVIN AND PITZER, Albion, Ill., have applied for a permit to dredge sand and gravel from the Wabash river near Grayville, Ill. The sand and gravel will be placed ashore for commercial purposes.

New York Highway Program

CHARLES H. SELLS, superintendent of public works in New York, has reported that $2,000,000,000 must be spent by the state during the next 14 years in order to make state highways efficient and safe, and estimated that 1150 miles of highway a year must be constructed to meet the 1960 goal. The highway rehabilitation program is a year and a half behind because of high prices and shortages of equipment, but now the highway program is expected to be undertaken at an expanding rate, especially with motor vehicle miles scheduled to increase from 2,700,000 to 4,000,000 in the 14-year period.

High-Alumina Cement In Hot Climates

RESULTS OF TESTS made to ascertain the cause of low strengths obtained for concrete made with high-alumina cement used in tunnel construction in Iraq have been summarized showing that within the range 60 to 110 deg. F. the compressive strength decreased almost proportionally as the shade temperature rose. It was concluded therefore that there is no advantage in using high-alumina instead of portland cement for concreting in shade temperatures exceeding 85 deg. F., nor should compressive strength values greater than 600 lb. per sq. in. be expected in such cases. These facts were reported in *Highway Research Abstracts*, September, 1947.

Gypsum Export Trade

GYPSUM LIME & ALABASTINE Co., Canada, is exploring possibilities for developing an export trade for gypsum, with an eye to reopening the gypsum deposit five miles from Mabou, N. S., which was closed in 1942 due to lack of shipping facilities. The deposit is the property of a wholly owned subsidiary, the Nova Scotia Coal and Gypsum Co.

Eastern Headquarters

UNIVERSAL ZONOLITE INSULATION Co., miners and manufacturers of vermiculite building and insulation products, has established eastern division sales headquarters at 50 Church st., New York 7, N. Y., with W. A. Olsgard as eastern sales manager.

Awarded Contract

INDEPENDENT GRAVEL Co., Carthage, Mo., has been awarded the contract for resurfacing the west side of a square on the city's Main street.

Stone Co. Splits Stock

KENTUCKY STONE Co., Louisville, Ky., plans to split its stock ten for one. First quarter earnings more than doubled those of a year ago.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Bumper for Haulage Unit

A PARTICULARLY DENSE and hard packed overburden encountered at the Crystal Lake pit of Consumer's Co.,

Bumper attachment for haulage unit

Chicago, makes it necessary to aid Tournapulls at time of loading in the stripping operation. Extra power and traction is provided by a dozer, which is able to push its blade against the oversize half-round bumper extending from the rear of the Tournapull without injury to the blade. The bumpers were fabricated and installed in the shops at the pit.

Economical Stockpiling

By JAY EVANS

FOR the small crushed stone operator, the arrangement of crushers, screens, bins and conveyor belts shown in the illustration will cut down installation costs, and the cost of stockpiling and reloading from stockpile.

It will be noted that a single power unit operates both primary crusher and secondary pulverizer for agricultural limestone and small sizes. A metal pipe returns material from bins for recrushing in pulverizer. A belt conveyor or chain drag conveyor below the bins is employed to convey material to the stockpile with a tunnel running the entire length of the stockpile for loading out trucks, primarily for agricultural limestone.

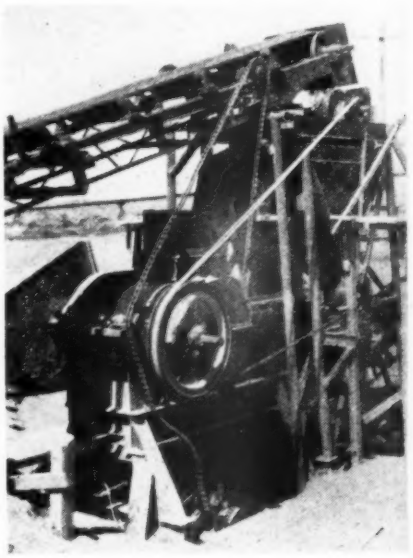
Pre-Formed Incinerator

AN INCINERATOR for burning paper cement bags is provided at the ready mixed concrete plant of Utah-Idaho Concrete Pipe Co., Caldwell, Idaho. The "incinerator" is standard equipment at the company's many plants because it is principally made up of a heavy reinforcing wire cage for concrete pipe. By providing the incinerator near the point of bag use, the new Caldwell plant is kept clean. Idaho-Utah Concrete Pipe Co. does not manufacture pipe at the new plant, but uses it as a pipe distribution point for pipe made in other plants; in addition to batching ready-mixed concrete. Several of the company's pipe plants are located in Idaho, plus two at Ogden and Provo, Utah.

Incinerator made from concrete pipe reinforcing helps keep yard clean

Unusual Drive System

WHERE Diesel power units are used to drive a sand and gravel plant, ingenious methods are often used to drive all the various equipment in order to keep the number of power units to a minimum. At the plant of F. M. Reeves & Sons near Roswell, N. Mex., a set of 24-in. J. E. Ingram rolls are used for secondary reduction. The roll crusher is driven by a D-1300 Caterpillar Diesel. From the fly wheel of the roll crusher, a V-belt drives a two-deck, 4- x 8-ft. Telsmith scalping screen. A jack-shaft, also driven off the rolls, drives the feeder conveyor (near the head assembly), and also the off-bearing conveyor (near the tail assembly) by means of a long chain drive that goes over the drive sprocket and thence to the two driven units. With this arrangement four separate operations are powered from one Diesel unit.

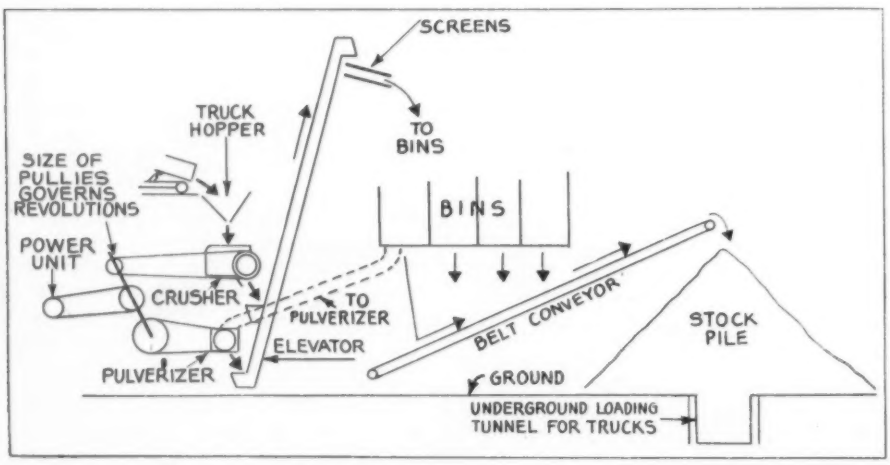


Showing how a single Diesel power unit drives four separate operations

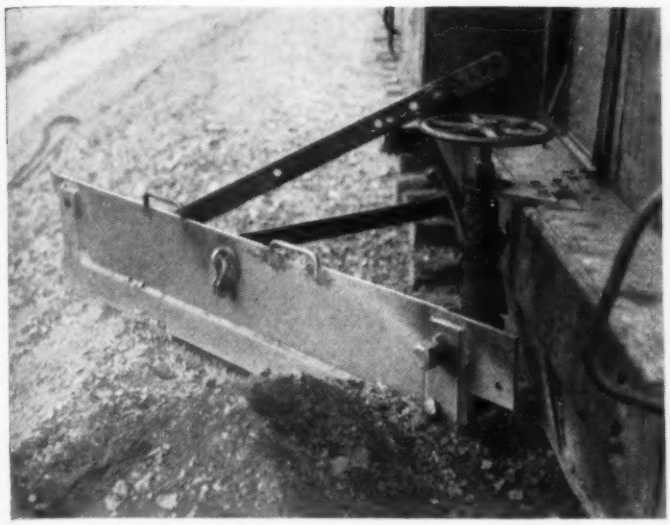
Large-Opening Water Sprays

NOT all companies find it necessary to have elaborate water sprays for washing gravel as sprays sometimes clog up from time to time. After all, it might be said that it is the water that does the good, so why not pour it on and get the most from it.

Believing in this principle, the Al-



Economical arrangement of plant, bins, screens, and conveyors for small operation



Left: Adjustable plow attached to locomotive side frame spreads "crusher run base rock" being stockpiled. Right: Showing track being lifted by track shifter preparatory to throwing

buquerque Gravel Products Co., Albuquerque, N. Mex., simply uses a 4-in. header across each vibrating screen with about 10 outlets per header, each outlet being ¾-in. in diam-

Header pipe over vibrating screen has ¾-in. outlets, serving as sprays for washing gravel

eter. At the time of inspection the plant was turning out about 500 tons per day and using around 500 gal. of water per minute. The illustration shows this simple and effective means of washing gravel on a vibrating screen.

Material Dumping Track-Shifting Operations

By ROYAL E. FOWLE
Vice-Pres. and Mgr., Granite Rock Co.

OPERATIONS of the Logan Quarry, Granite Rock Co., at Watsenville, Calif., call for the storage of "crusher run base rock" in a 100-ft. high storage pile. This material is transported to the storage location in 5-cu. yd. Western side dump cars which are pulled by steam or gasoline locomotives. The material is dumped over the side and the pile allowed to fill on its natural slope.

The same method was used in forming a shovel pit in former quarry operations. (ROCK PRODUCTS, Dec., 1945.) As the quarry face receded from the track on which cars were loaded a backfill was made and the rails thrown in toward the quarry face.

Each of these material-dumping, track-shifting operations required that a large number of men do heavy work to keep the dumped material from piling up at the ends of the ties thus preventing further dumping. The barring over or shifting of the track by hand also called for a large number of men.

The work required in the material handling was greatly reduced by the use of a plow or spreader attached to the side of a Plymouth locomotive frame as shown in one of the illustrations.

The work required in track shifting was greatly reduced by the use of a track shifter, shown herewith, which operated behind the spreader.

Drill Alignment

WHEN drilling horizontal or breast holes with a wagon drill, broken shanks, especially on the deeper holes, can upset calculated cost economies. Usually when the hole is first started, the drill mechanism sets well back on the carriage, but as the hole deepens and the drill advances toward the end of the carriage there is a tendency for the assembly to drop down a fraction of an inch. Most of this strain is on the first foot or so of the drill shank, and this strain, along with the drilling action, can break shanks as fast as the blacksmith can re-shank them.

An eastern quarry has provided a gauge mounted at the end of the drill carriage so that the operator can check the alignment of the steel from time to time. This gauge, supplied by the drill manufacturer, is simply a quick-opening, clamp-like device that fits snugly around the steel when the drill is in proper position. If the steel is out of alignment, the clamp assembly simply won't fit and the operator of the drill must make the proper adjustments.

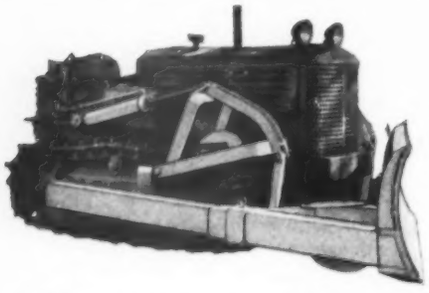
By watching this point of trouble, one operator reduced shank breakage very materially.

Left: Clamp to keep drill steel in alignment. Right: Wagon drill equipped with clamp to hold steel in alignment

new MACHINERY

Twin-Controlled Dozers

DROTT MANUFACTURING CORPORATION, Milwaukee, Wis., is now in production on the twin-controlled tilting bulldozers and bullangledozers. Both



Angledozer which may be raised or lowered while tractor is in motion or standing still

dozers are operated by a closed hydraulic system. The name, Twin-Contro, is derived from the twin pump arrangement, mounted and concealed on the front of the tractor. Each pump operates a cylinder through separate valves and enables the operator to raise or lower either side of the blade from the seat, while the tractor is in motion or standing still. These products are now distributed through Oliver Cletrac dealers.

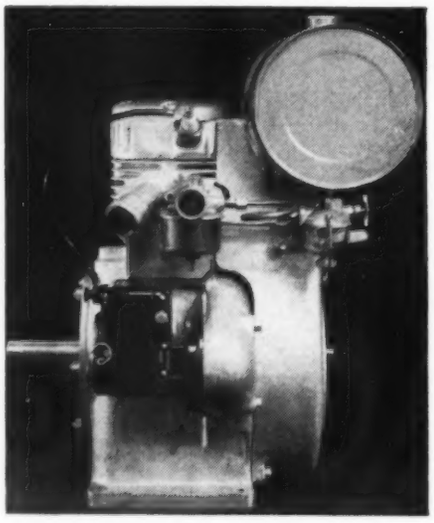
International Harvester 100th Anniversary Show

INTERNATIONAL HARVESTER CO., Chicago, Ill., recently held an outdoor exhibit at Soldiers Field, Chicago, of all equipment the company manufactures in commemoration of the 100 years the company has been in business. Four large tents were provided for historical and manufacturing exhibits, with the balance of the eight acres being devoted to equipment displays.

The largest pieces of machinery were all related to the basic rock products industry, including: an 8½-cu. yd. Heil end-dump ore body, mounted on an International W-6564-OH truck, powered with a 200-hp. Cummins Diesel; an 8-cu. yd. Bucyrus-Erie S-90 scraper powered by a TD-18 International tractor with 70.6 drawbar hp. and equipped with a Bucyrus-Erie hydraulic bull grader. Largest single Diesel power unit was the UD-24, 175-hp., provided as a self-contained unit to supply power for rock crushers, etc. One of the tents was given over to floor shows and radio broadcasts.

Air-Cooled Gas Engine

AEROLITE ENGINE CO., INC., Bayonne, N. J., has developed a portable four-cycle, air-cooled gasoline engine for pumps, tractors, and other uses

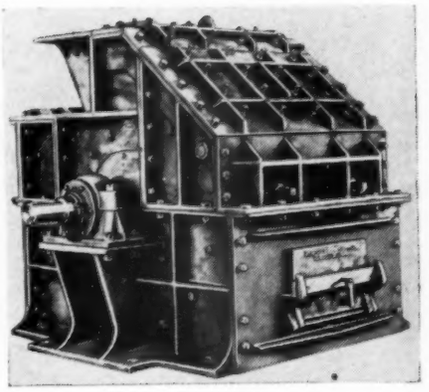


Lightweight portable gasoline engine

requiring a light, portable unit. The engine is rated at 7.5 hp., 3200 r.p.m. It has a 3-in. bore, 3¼-in. stroke, and weighs only 59 lb.

Hammermill Improvement

AMERICAN PULVERIZER CO., St. Louis, Mo., has announced its Model ACS hammermill, with heavy-duty



Hammermill with center feed produces a high percentage of fines

center feed, can be obtained in capacities up to 250 t.p.h. of limestone. Individual size control assures a uniform run of desired sizes from road stone coarseness to agstone fineness in the same run with accurately governed ratios, according to the manufacturer. It is of sectional cast steel construction with manganese steel crushing parts.

The new center-feed design allows material to fall well back on rotor, giving longer travel in hammer circle with greater frequency of impact. This results in a finer product with a maximum of fines.

Detachable Well-Drill Bit

SMALL DRILLS such as pneumatically driven blast hole drills, up to 2-in. in diameter, have long had the advantage of replaceable cutters—and now the much larger churn drill can also be fitted with detachable cutters. Briefly, the invention consists of a 10-in. section at the cutting end of the bit which is attached to the main drill body by means of two 10-in. arms that fit closely into two machined grooves on either side of the main bit body. Two specially designed ¾-in. fastening bolts complete the assembly.

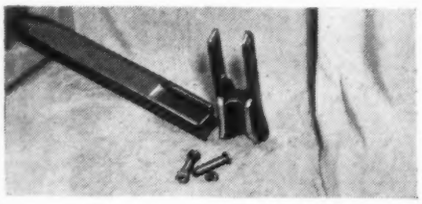
Chief advantage claimed for the new-type bit by the inventor, W. F.

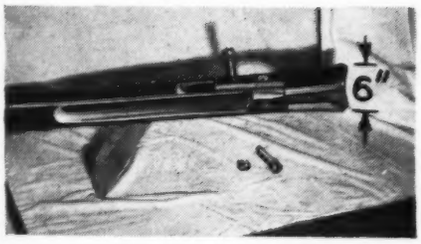
Left: International tractor and two-wheel Heil trailer wagon. Center: Large Diesel power unit. Right: International tractor and Bucyrus-Erie scraper

Bock, Melrose Park, Ill., is that only one-eighth as many man-hours are spent changing drill bits on a given job as compared with the standard churn or well drill bit now in use. One man can complete the entire change in ten minutes, using a wrench weighing one pound. As the actual cutting bit is so small, it can be made economically of the hardest alloy steel obtainable. This last factor, Mr. Bock states, will enable the new bit to outlast three sharpenings of a standard bit.

The two machined bolts with tapered heads that hold the cutter to the main drill body are screwed in from opposite sides. As an added precaution, tapered nuts are then placed on the ends of the bolts, with the two tapers pulling toward each other so as to preclude the entrance of dirt at this point. The point of contact between the main body and the cutter is the total diameter of the bit.

Other advantages claimed for the new bit include: the ability to sharpen bits in the field with no heavy machinery necessary. The new cutters will be made to fit any bit that has been





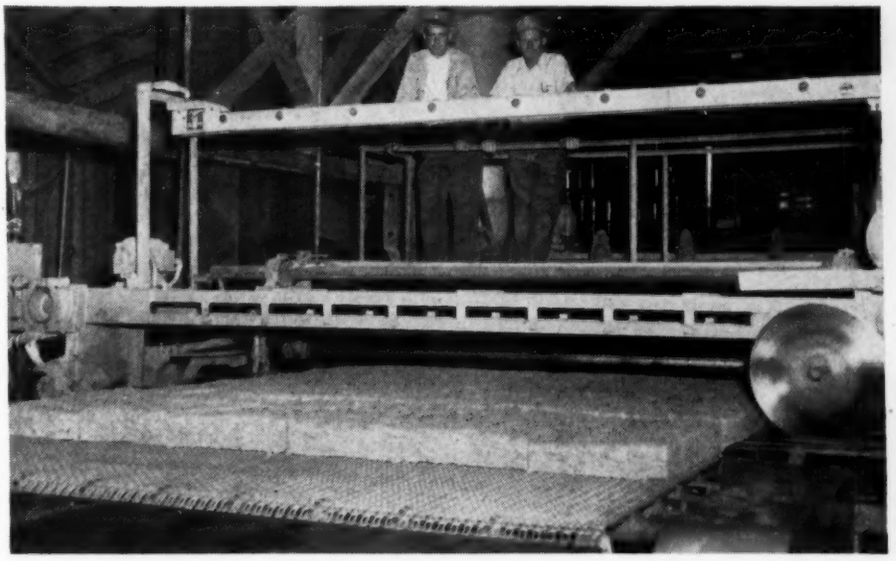
Above: Showing component parts of detachable churn drill bit. Below: Partially assembled drill bit, showing how parts fit together

prepared to receive this type of end. Because of the facility with which a cutter may be changed, it is expected that the drill operator will keep sharp bits in the hole, thus making drilling a faster operation. Two or more cutters of a given size would be kept on hand at the site of the rig.

The trial bit made by the inventor is of the 6-in. size, and has been proven in actual field trials. According to the operator of the rig where the new bit was tried, it spun perfectly and followed through, giving absolutely no trouble.

Welding Electrode

HOBART BROTHERS Co., Troy, Ohio, has brought out an electrode, "Hobart No. 12," which is designed to increase welding speed on poor fit-up work. It is available in 3/32-, ⅛-, 5/32-, 3/16-, and ¼-in. diameters.



Batt machine with a capacity of 110,000 sq. ft. per day of full-thickness batts

Batt Machine

THE CARNEY COMPANY, INC., Mankato, Minn., has developed a rockwool batt machine which turns out six standard size batts simultaneously. A crosscut saw cuts 12 2-ft., or six 4-ft. size batts, according to adjustment. Batts of various thicknesses up to 6-in., and in density up to 6 lb. are produced by the machine. The blow chamber is 50 ft. long, 9 ft. 6 in. wide, and 25 ft. high.

As installed at the new Industrial Products Corporation plant at Nashville, Tenn., by engineers of The Carney Company, Inc., a 48-in. cupola unit supplies rockwool for the batt machine. Vapor barrier on the batts is applied over a double steam roll suspended in a pit, at temperatures in excess of 300 deg. The Industrial Products Corporation is producing up to 110,000 sq. ft. of full thickness resilient batts a day. Similar rockwool equipment is to be installed in the new Carney-Pacific Rockwool Co., at Longview, Wash.

Fire Hose

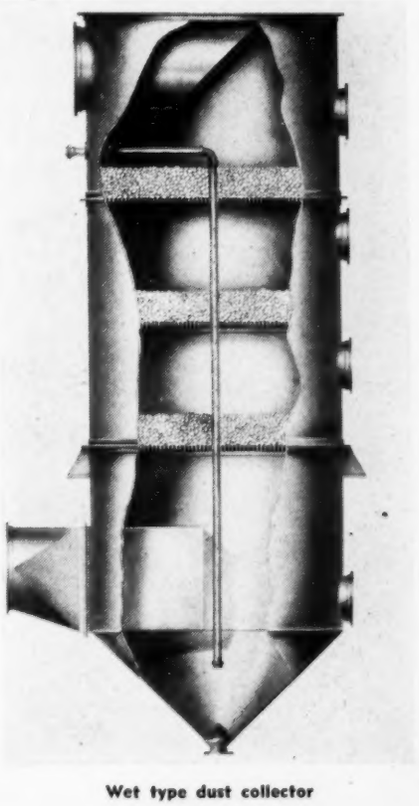
HEWITT RUBBER DIVISION, Hewitt-Robins, Inc., Buffalo, N. Y., has announced the resumption in production of its top brand Maltese Cross fire and chemical hose which was withheld during the war because of government restrictions.

Wet Dust Collector

PAUL E. MCKAMY & ASSOCIATES, Chicago, Ill., has developed the Pemasco system of dust collection which incorporates a wet type collector. There are said to be no moving parts which reduces maintenance to a minimum. The units are built in 30 different sizes.

The interior construction of the collector varies. Some of the models contain one or more beds of ceramic packing material in the scrubber and entrainment elimination sections, the number depending upon the problem involved. Packing is supported on open grids, and a centrally located spray pipe distributes the water evenly over the packing.

Dust laden air enters the chamber tangentially at the bottom, passes upward through the sprays and beds of packing and out the top outlet. Dust and dirt leave the unit at the lower outlet in the form of a dilute sludge. Ponds or settling tanks especially designed for the purpose are used to concentrate the sludge, the water being recirculated continuously.



Wet type dust collector

MANUFACTURERS' IDEAS TOME

Editors of ROCK PRODUCTS review new problems faced by producers and present illustrated descriptions of the latest equipment of manufacturers designed to cut costs and improve products

Instrumentation-Calcination

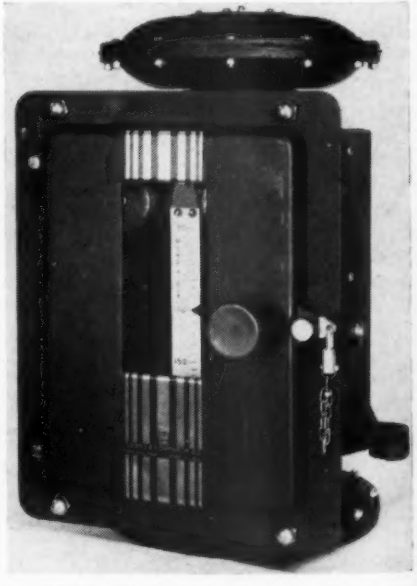
By BROR NORDBERG

APPLICATION of instruments to rotary kiln operation has been the objective of continuous experiment by manufacturers, and the potentialities of instrumentalized control have intrigued producers of portland cement and lime who visualize the time when all the variables that enter into the firing of kilns may become completely controllable with near positive accuracy. Great strides have been made toward that goal even though variations in fuel difficult of control and the not completely understood behavior of kilns, particularly those over 300 ft. in length, present challenging difficulties.

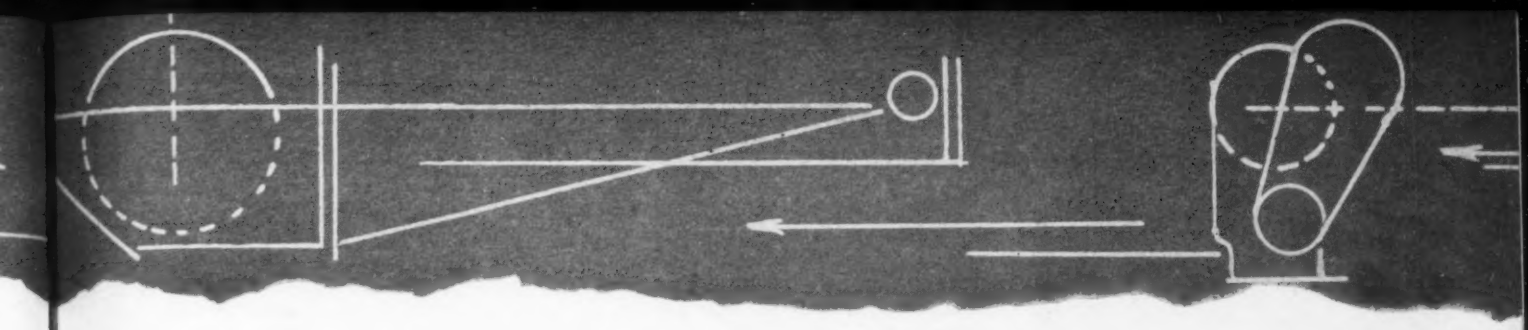
Surging in long rotary kilns, the build up of mud rings and slag rings will continue to be the object of intensive study by plant operators; those occurrences chiefly contributing to nonuniformity of production, reduced refractory life and difficulty in control of firing conditions. Rising fuel costs have focused attention on the necessity for maximum heat utilization and, as a result, kiln design and improvements to plant are planned to realize that objective.

As firing difficulties like those we mention become more understood, the more fully can control instruments be effectively utilized while, on the other hand, the application of instruments to the greatest possible extent is contributing in many cases to the correction or minimization of those same firing difficulties even where plant equipment in operation needs modernization. Control instruments, obviously cannot be the means to optimum possible fuel utilization if, for example, there is leakage into a kiln hood that prevents maximum utilization of preheated combustion, air, or induced draft fans have insufficient capacity, or there are other shortcomings. Yet, they are being used effectively under none too ideal circumstances but oftentimes not to greatest or most complete advantage.

Even where an instrument which continuously records temperatures as picked up by an optical pyrometer focused on clinker or the hot zone lining, cannot give a correct reading in actual figures because of dusting conditions associated with the flame, the instrument can serve several useful functions. It can be a means to holding uniform conditions and serve as an indicator of abnormal developments within a kiln that will confront the operator. Where thermocouples at critical locations along the kiln length are the means of recording temperatures continuously, at those points, fluctuations in readings will indicate the formation of mud rings and even the dislodgment of a ring, to guide the burner in adjusting his flame in



L & N air-fuel ratio controller to meter automatically fuel and air supplies and to proportion them in correct ratio for kiln operation



TO MEET DIFFICULT OPERATING PROBLEMS

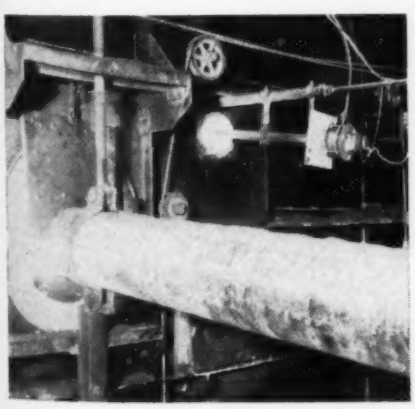
anticipation of a surge through the hot zone probably an hour or two later.

Newer kiln installations are being designed for instrument operation and for automatic control of many of the firing variables. Not only have more individual instruments been developed for automatic recording of temperature, pressure, air flow, draft, etc., and to operate as controllers for actuating and regulating dampers and other adjusting devices, but also for automatic adjustment of the several related variables affected by a single change.

NATIONAL GYPSUM CO'S. new rotary kiln lime plant, discussed elsewhere in this issue, probably is representative of the most advanced practice. Here we have indicating and recording devices for practically every measurable firing factor, and instruments to automatically hold the primary air-coal and the primary air-secondary air ratios at predetermined points. The control panel is set up to make compensating changes automatically should the burner make a single firing change. Should he decide to increase primary air flow for higher heat, the rate of coal feed, secondary air flow and induced draft would automatically change in proportion. Development is progressing toward complete automatic firing of rotary kilns. A single rotary cement kiln with which we are familiar is said to have a $35,000 investment in instrument controls.

Instrument Developments

Closer control of kiln operation through the application of modern instruments has enabled many producers of portland cement and lime to improve quality and uniformity of product while effecting reduced fuel costs and reduced down time. The basic factors measured and often controlled are kiln temperature, and the draft and speed of rotation.



Detecting rotary kiln temperature by a Rayotube radiation element

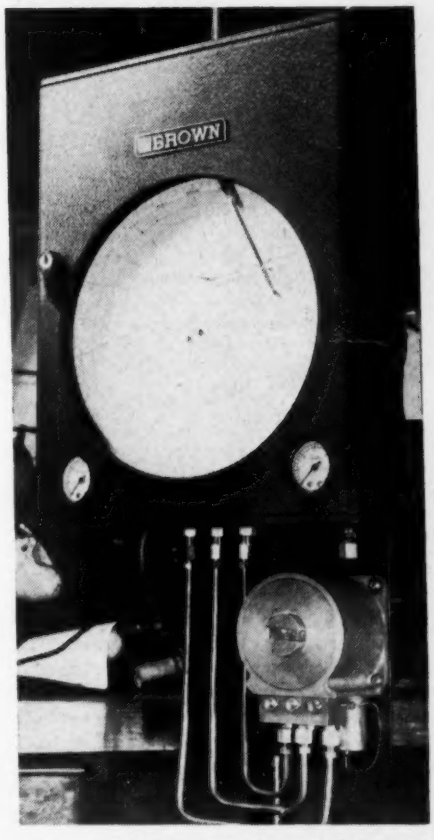
Temperature is probably the most important single factor in rotary kiln operation and the usual practice, with instruments, is to measure by optical pyrometer the temperature of either the kiln lining or the clinker itself. The continuous temperature record is a guide to the burner in adjusting the rate of fuel feed to hold a definite burning temperature range and, in some plants, the pyrometer automatically actuates the fuel feed rate in accordance with temperature fluctuations.

Several of the leading manufacturers of instruments have commented on the various applications of instrumental control and new developments of comparatively recent dates which we summarize in the following:

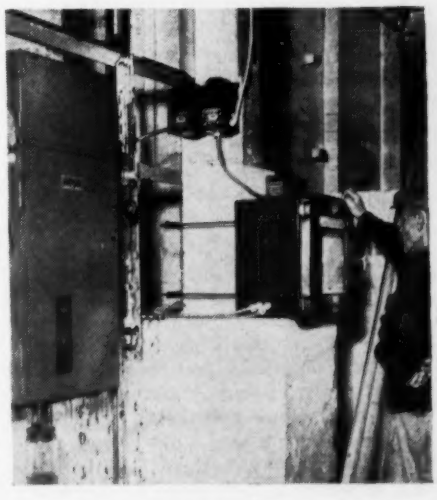
THE LEEDS AND NORTHRUP CO. has applied its Micromax pyrometer to control automatically the preheat temperature of air passed over clinker cooling grates, in cement plants. Temperature of the preheated air is detected by a thermocouple in the wall at the entrance to the grate and recorded by the pyrometer which acts through a control unit and electric drive mechanism to regulate the grate drive speed. As temperature of air flowing over the grate increases or decreases, the speed of the grate is automatically raised or lowered proportionately. Depth of the clinker on the grate changes and, with it, the amount of heat transferred to the incoming air.

These instruments are also used to record temperatures in kiln outlet flues, in the common flue where there are several kilns so arranged, in the inlet to waste heat boilers, in boiler passes and in stacks. They are adapted to record temperature of flue gases just ahead of induced draft fans and to sound an alarm if the safe temperature limit is exceeded. Multiple-point recorders, for as many as 16 separate temperature recordings on a single instrument have been made available.

Devices have been developed by several instrument manufacturers for automatic control of kiln draft and



Brown Air-O-Larm, an instrument to warn of undesired conditions in the value of pressure, temperature or liquid level



L & N Micromax oxygen recording equipment for analyzing flue gases for oxygen. Gas analysis cell assembly on left detects oxygen content of a continuous sample and recorder indicates and records in per cent oxygen

Showing how rotary kiln draft is held constant by L & N draft controller which actuates an electric-motored drive, here coupled to a louvre damper

air-fuel ratio. The L & N Furnace Pressure Controller controls draft by means of a mechanical balance which weighs the pressure inside the firing end of a kiln against atmospheric pressure. Through a relay and motor-driven interrupter it actuates an electric drive unit which opens or closes the stack damper. Two sets of contacts are provided to enable fast movement of the damper in response to large draft changes, and slower movement for small changes in draft.

The L & N Air-Fuel Ratio Controller meters combustion air, and either gas or liquid fuel, and as fuel flow changes to hold a constant temperature it automatically varies the air flow in proportion. It can operate to control fuel as air flow changes and be set up to control both primary and secondary air supply, maintaining automatically a predetermined fuel-air ratio. Electric-motored valve drives are employed by the controller.

L & N Micromax oxygen recorders, designed on the thermal conductivity principle, as used for measurement of CO_2, H_2 and other gases, have been adapted to measurement of oxygen in flue gases as a means to gauging combustion efficiency. The principle is the "hydrogen-difference" method, which consists of adding hydrogen to the gas sample, removing oxygen by combustion and electrically comparing the conductivity of the sample before and after the oxygen is removed. This device serves as a guide to regulating excess air in rotary kilns.

Continuous speed recorders consisting of electric tachometers coupled to kiln drives and instruments for continuous record in r.p.h. are coming into wider use.

The L & N Speedomax Indicator has been developed for logging a large number of thermocouple temperatures on a single instrument and has possible application where it is the desire of plant operators to know kiln temperatures at various locations throughout the length of a rotary kiln.

THE BROWN INSTRUMENT CO. has contributed a number of developments in instruments the past several years.

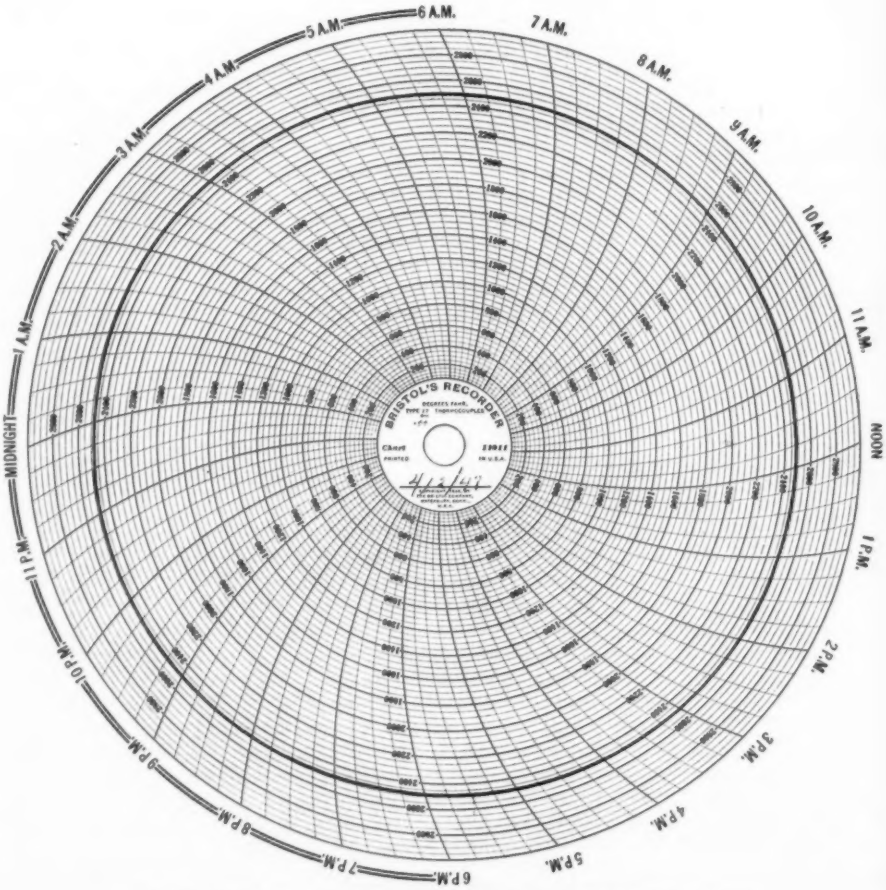
The Electronik recording potentiometer has been developed for applications including the recording and control of process variables such as temperature and pressure where extremes in sensitivity and accuracy are required. The most important feature of the device is the elimination of periodic rebalancing and it is said that the utilization of electronic principles enables the instrument to be maintained in a continuously balanced state, eliminating measuring lag and thereby resulting in instantaneous measurement and control action.

The Electronik Strip Chart potentiometer has been developed for application where vibration, wide variations in ambient temperatures and continuous rapid changes in position are encountered and where there is need for the maintenance of multiple records of temperature, etc., simultaneously on one instrument or over long periods of time.

The Brown air-operated ratio controller is for the maintenance of fuel to air ratios and other processes where the flow of one variable with respect to another must be held to a certain ratio. The instrument is a two-pen recorder with pneumatic control provisions on one of the two pens, and provides for changing the desired ratio over a wide range. Uncontrolled changes of the primary variable occur and the ratio controller acts to regulate the secondary variable to maintain the desired ratio.

The Electronik line of instruments is combined with electric proportioning control in the Electronik Circular Chart Recording Electric Proportional Controller. A bridge circuit between the instrument slidewire and a motor slidewire on the valve mechanism in conjunction with a relay which detects any unbalance in the bridge circuit provides a valve position for every value of the controlled process variable. Application is for operations requiring proportional control of a process variable.

Signal and alarm signals are provided in the Brown Air-o-Larm for temperature, pressure, liquid level, etc., processes to announce changes or undesired conditions. The device comprises a pneumatic flapper nozzle mechanism which mounts inside the recording instrument, together with air-operated mercury switches which are mounted within an explosion-proof



Temperatures recorded in firing oven of Ellernan continuous calciner

housing. Adjustments and switch actions provide for energizing the signal system at increasing or decreasing values of the measured variable; departure of the variable from either a high or a low value; increase or decrease of the variable over high and low limits. It may be used to energize electrical circuits, operate solenoid valves and actuate relays.

For applications wherein pressure or temperature can be electrically controlled, Brown has developed the Electr-o-Vane controller-recording-indicating process controllers which incorporate transmittal of pen movement to a vane which governs oscillations in electronic circuit. The interruption of the oscillations results in non-cyclic, snap-action control of the process variable. It may be added to existent instruments.

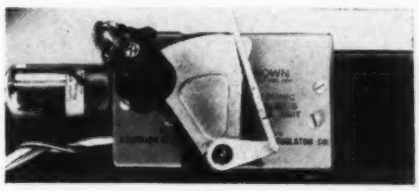
Other recently developed Brown instruments are the Adjustable Indexet which provides a means for manual adjustment of the relationship between the controlled air pressure and the position of the secondary control index in metered control systems; the resistance thermometer for temperature measurement; and the Indicating Electronik Continuous Balance Controller for temperature and pressure control, contact and proportional, where permanent records are not neeeded.

BAILEY METER CO'S. newest electronic pyrometer has no continuously moving or vibrating parts in its measuring circuit and records two temperatures on a 12-in. uniformly-graduated chart and indicates one on a 29-in. scale. This is an indicating, recording and controlling instrument, requiring a 115-volt, 60 or 50 cycle, a-c current supply, and is applied to kilns by means of a thermocouple with slip rings or a radiation element.

The potential of the thermocouple or other primary element is balanced against a potentiometer circuit employing battery source of voltage and a standard cell with manual standardization. The Bailey Pyrotron circuit employs an electronic detector to measure potentiometer unbalance. Only the recording chart moves continuously, the reversible electric motor which drives the indicating, recording and controlling features moving only when the potentiometer network tends to become unbalanced because of a change in the factor being measured. Conversion of d-c potential to a-c is accomplished by saturable core reactors.

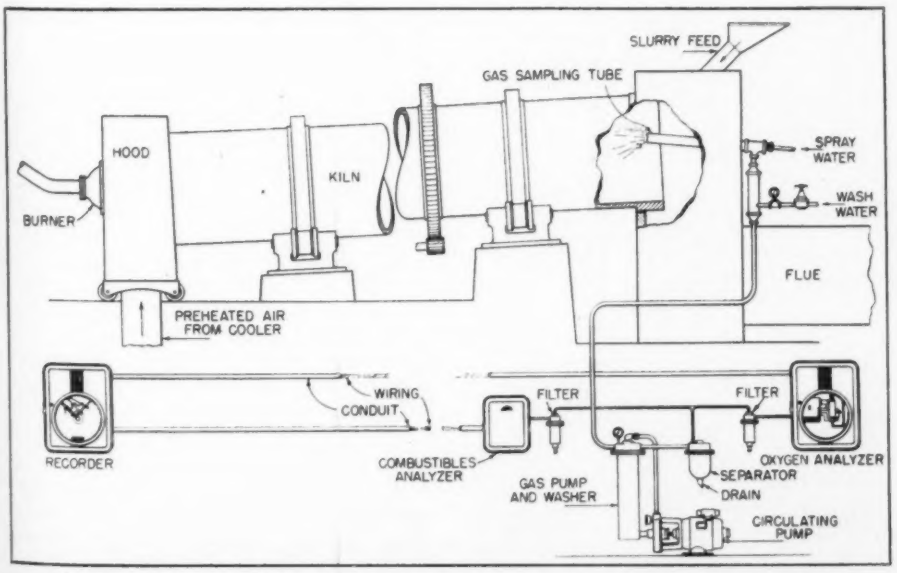
Because of inertia-free electronic detection and instant response, this instrument is said to be an effective controller for temperature. It may be furnished with two controllers operating from two entirely separate measuring circuits and, for air-operated control systems, on-off electric control systems and throttling type electronic control systems.

Another Bailey device is the electronic recording, indicating and controlling tachometer for kiln operation

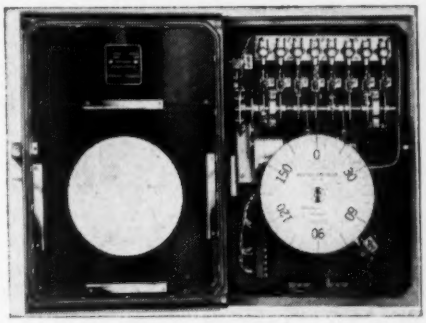


Controller-recording-indicating device (Brown) for processes wherein pressure or temperature can be electrically controlled

which consists of a heavy duty magneto generator used in conjunction with a standard electronic recorder. The generator is usually geared to the kiln or kiln drive at a gear ratio of about 1000:1. It may also be driven by a friction drive and geared up to the same ratio. The recorder is electrically-connected to the generator.



Diagramatic layout of Bailey oxygen and combustible recorder as applied to a rotary kiln



Controller (Bristol's) for timing mechanical operations involving opening and closing of valves, dampers, etc.

Bailey has an automatic continuous recorder for recording either the oxygen or combustibles content of kiln fuel gases. The oxygen recorder may be calibrated to read in terms of per cent oxygen or excess air, the combustibles recorder in per cent combustibles or mixture ratio. Each instrument includes a thermo-electric analyzer and a rapid, water-cooled, water washed gas sampling system. It is claimed that each recorder, which provides a graphic analysis, is responsive to changes of 0.05 per cent oxygen or combustibles and that sustained accuracy is within 0.25 per cent.

In the oxygen analyzer a continuous gas sample is mixed with a vaporized liquid fuel and burned on a catalyst-filament which reaches a temperature proportional to the oxygen content. In the combustibles analyzer no fuel is necessary and the gas sample alone is burned. The temperature reached by the catalyst-filament is proportional to the combustibles content.

The filament resistance is a function of its temperature and a resistance bridge is connected to a standard Bailey electronic recorder operating on the null balance principle. Sampling systems and gas analyzers are usually located at the feed end of the kiln and the recorders at the firing end on the control panel. Since the connections between the analyzers and recorders are electrical, there is no time delay in transmittals and it is said that changes in oxygen or combustibles content are recorded within 10 or 15 seconds of their occurrence in the kiln.

An air pilot valve is provided on the recorder for air-operated control, and high and low alarm contacts for operation of signals or interlocks may also be provided.

Many other instruments than the foregoing have been devised by the various manufacturers. THE BRISTOL CO. has developed a multiple-cam cycle controller for timing mechanical operations in industrial processes where a number of factors, such as the opening and closing of valves, switches, dampers and the starting of, stopping or reversing of motor-driven pumps and blowers must be accurately timed. In operation, this device actuates or

engages, at the correct time in each cycle, the necessary mechanical, electrical or pneumatic devices for automatically carrying out the schedule.

Other Bristol instruments of comparatively recent development are improved tachometer recorders and indicators, recording thermometers and gauges and an instrument that records the "on" time of production machinery and other equipment.

CAMBRIDGE INSTRUMENT CO., several years ago, announced a four-point automatic gas analyzer which continuously and simultaneously records oxygen, carbon dioxide, carbon monoxide and hydrogen present in a sample of gas. The instrument is of the thermal conductivity type, making analyses by a series of thermal conductivity elements interspersed by absorption and other corrections between cells.

Calcining

Desire for more accurate control of calcining operations, to achieve product uniformity and fuel economy is being reflected in a very pronounced trend toward long rotary kilns, some of substantial diameters and even enlarged calcining zones, with many types of instruments incorporated into the operating plan. The trend continues toward more accurate proportioning (in cement manufacture) in line with emphasis on quality of product as produced by rotary kilns and the industry is well on the road to perfecting the operation of long rotary kilns.

Several entirely new designs of calciners, or furnaces, for the burning of lime were devised the past several years. The Ellernan Calciner, an automatic continuous feed and discharge unit, is one design specifically to burn small limestone sizes, down to ¼- or ½-in., into lime. A number of these units have gone into production. The unit preheats the stone, calcines it into lime and cools the product as one continuous automatic operation. The operation of this calciner, manufactured by the Ellernan Co., and its performance in an actual installation are fully covered in an article published in the November, 1947, issue of ROCK PRODUCTS, pp. 86-87.

The Nelson inclined furnace, introduced by Victor J. Nelson Engineering Co. several years ago, reportedly is being extensively introduced into South America. This unit is designed with preheating and deheating devices, and with capacities of 12 to 15 tons of lime per day. The manufacturer recommends multiplicity of units in proportion to tonnage desired.

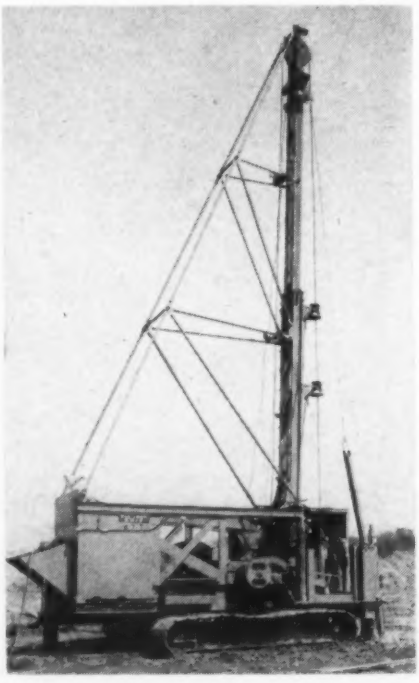
The principle consists of passing 1½- to 4-in. stone inside the furnace, where stoker rods keep it flowing at a regulated rate down the incline to discharge at the bottom. Air is introduced through the outlet door and over the heated material to preheat it before it is brought into the firing chamber and for cooling purposes. The air flows back under the material bed to the exhaust and stack temperatures as low as 200 deg. F. are claimed. Two 1-hp. motors are required and fuel oil or gas are the recommended fuels.

An entirely new process for the calcination of fines will be fully described in the January, 1948, issue of ROCK PRODUCTS.

DRILLING - BLASTING

METHODS and types of drilling equipment have not changed radically in recent years, but there have been a number of notable improvements. Perhaps the only distinctly new method is the use of the so-called "fusion-piercing blast hole drill" developed by Linde Air Products Co., in which a flame at 4000 deg. F. temperature produced by burning oxygen and a flux-bearing fuel in a special blow pipe is directed against rock. However, this method is still in the experimental stage although it has been tested under practical operating conditions.

Heretofore, diamond drilling has not been used extensively in the rock products industry, but National Gypsum Co. has used the diamond drill at its Bellefonte, Penn., mine and reports some excellent results. A complete account of this company's use of the diamond drill was published in ROCK PRODUCTS, December, 1946, p. 112, in a report to the Operating Session of the National Lime Association by Keith Waugh. Essentially, the operation is shrinkage stoping. Drill holes are 1⅜-in., spaced 9 to 11 ft. apart with 10- to 12-ft. burden and are loaded with 1¼- x 8-in. gelatin powders. A single primer, with instantaneous blasting, is employed. Greater safety, improved powder factor, better fragmentation, less capital investment, lower maintenance, less man-hours, and reduced secondary drill and dynamite are advantages claimed for diamond drilling over conventional methods.



A 42-T Bucyrus-Erie blast hole drill with hydraulic leveling jacks

All drilling equipment is now portable with well drills on crawler tread tractors, and wagon drills on pneumatic-tired carriages. The Marquette Cement Manufacturing Co. has mounted two wagon-type drills on a tractor, using a special assembly. This tandem arrangement is particularly effective in this company's quarry, but may not fit conditions where difficult terrain is encountered. Drifter drills are also mounted on pneumatic-tired or crawler tread carriages, have power feed for drill steel, and have an aligning attachment to reduce steel breakage to a minimum. In limestone mining operations, drifters have been mounted on steel platforms with portable carriages, at times at three levels, such as described in the story appearing in the November issue of ROCK PRODUCTS about the world's deepest limestone mine operated by Pittsburgh Plate Glass Co.

Secondary drilling with jackhammers has been made easier by reducing weight of the machine. Replaceable stud-type jack bits have been designed to reduce sharpening and increase drilling speed. Representative of this improvement is the new stud-type jack bit designed by Ingersoll-Rand.

GARDNER-DENVER CO. has brought out its URM motor feed wagon drill. It is designed for 6-ft. steel changes, the motor feed being operated by a 5-cylinder radial air motor driving an endless chain attached to a heavy mounting slide carrying the drill. Sullivan Machinery Co. has developed a rotary blast hole drill, using oil field practice. The 56BH will drill to 90 ft. or more and with holes up to 9-in. Bucyrus-Erie has equipped its blast hole drill with hydraulic jacks which reduce set-up time to a minimum. Worthington Pump and Machinery Corporation has improved its WMW-40 wagon drill, using a cylinder controlled blowing device to give better hole cleaning ability.

Delayed Action Blasting

Perhaps the most outstanding development during recent years has been "delayed-action blasting." L. F. Miller of New York Trap Rock Corporation gave an extremely interest-

ing talk at an Operating Session of the National Crushed Stone Association convention, and demonstrated an electrical timing machine for detonating blast holes by delayed action. In delayed action blasting, instead of connecting all the caps in series or in parallel, each hole or group of holes is a shot in itself with a slight delay between the firing of each hole or group of holes. The effect is to dampen out very materially any ground vibrations. The Atlas Powder Co. has pioneered in developing a delayed action electrical blasting machine, and preceding this development had introduced the Rockmaster delayed action blasting cap. E. I. DuPont de Nemours & Co. has improved its electric blasting caps with nylon-insulated wires and rubber plug closures.

Blasting techniques and explosives have been improved with the object of obtaining better fragmentation to eliminate the need for secondary drilling and blasting as much as possible. Many quarries are now using the steel drop ball, dropped with the aid of a shovel boom, for the reduction of stone too large to be handled by the shovel.

STRIPPING - EXCAVATION

By RALPH S. TORGERSON

SOME very definite trends have been noticed in the excavating practice. Stripping costs have been materially reduced by the use of tractor-scraper units of extremely large capacity, up to 17 cu. yd. struck capacity, and with earth-moving haulage units drawn by tractors having a capacity up to 35 tons. In fact, if this type of unit had not been developed for stripping, some of the deposits now worked would not be economically feasible. Up to 75 ft. of overburden is now removed with tractor-scraper type units.

Shovels and draglines also continue as very useful stripping tools. The large walking dragline is to be found in such large operations as the flux stone quarries around Youngstown, and in the phosphate fields of Florida where it is also employed to reclaim phosphate raw material from the deposit. The Bucyrus-Erie walking dragline used in the phosphate field will handle up to 25 cu. yd. and is electronically controlled.

One of the largest capacity tractor-scraper units is the TS-300 Moto-Scraper recently introduced by La-Plant-Choate Manufacturing Co. The scraper of this unit has a capacity of 17.5 cu. yd., and the tractor unit is equipped with a 225-hp. Diesel engine. R. G. LeTourneau, Inc. has brought out an electrically-controlled 35-ton Model B. Tournapull, powered by a 225-hp. Diesel engine. Caterpillar Tractor Co. has developed three sizes of open-bowl scrapers of 13.8, 8.7 and 6.0 cu. yd. capacities. The Heil Co., Milwaukee, Wis., has designed a two-wheel tractor for stripping which has a 15-cu. yd. capacity.

Tractor-bulldozer units are being used extensively for stripping and clean-up operations around shovels. In handling loose materials, such as sand and gravel, the tractor-dozer is used to push material to conveyor field hoppers and to keep the area around stockpiles cleaned up. Another recent development is the attachment of a boom to the end of the tractor, utilizing the hoist to convert it to shovel or dragline operation with bucket capacities up to ½-cu. yd. The Hyster Co. recently announced one of these attachments for tractors.

Loading

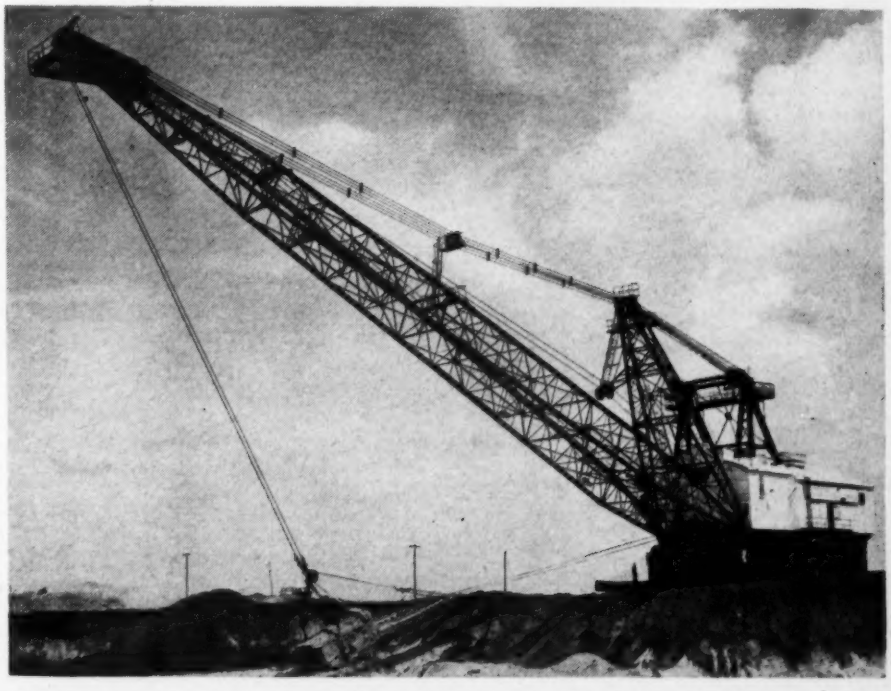
Loading stone at the quarry face has been speeded up. Shovels are much more rugged, have greater power, and larger capacity. These improvements in part have been brought about by extraordinary demands of the war and post-war construction. Larger primary crushers have made it essential that the shovel have sufficient capacity to keep an uninterrupted supply of stone moving to the primary crusher. No plant is efficient if its shovel operation and haulage units to the crusher are not coordinated to this end.

Air controls on shovels have done much to reduce operator fatigue. Shovel operations have all been speeded up by the manufacturers of this equipment. Sizes of shovels are now available to fit any type of demand from the ¼-cu. yd. type for the small agstone producer up to 6-cu. yd. and larger for the big operator.

Several new shovel and dragline models have been announced by Lima Shovel and Crane Division, Lima-Hamilton Corporation. The type 2000 is a heavy-duty machine with a capacity of 3½ to 5 cu. yd., the dragline capacity depending upon the length of boom and weight of the material. It is Diesel-engine powered. Another Lima model 604 is a 1½-cu. yd. shovel adaptable to crane or dragline service. It has air control on all major functions, including steering, swinging and propelling, hoisting, crowding and retracting, boom hoist, dipper trip, shift from swing to propel and the swing brake. Either Diesel or electric motor is supplied for power.

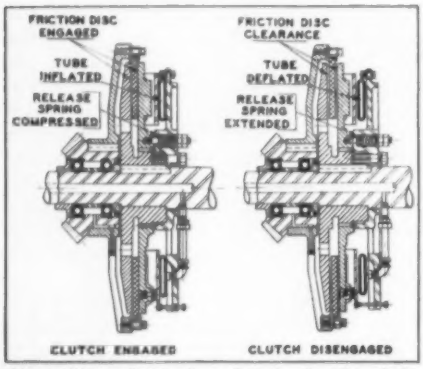
Three new shovels were recently brought out by Marion Power Shovel Co. The type 93-M, which carries a 2½-cu. yd. dipper as standard equipment, is also adaptable for dragline operation. The type 111-M shovel carries a 3½-cu. yd. dipper. An electric shovel, type 151-M with Ward-Leonard power transmission, carries a 6-cu. yd. dipper and also is convertible to dragline operation. It has Amplidyne or Rototrol high speed electrical controls, and has a boom of all-welded construction.

One of the outstanding developments of The Osgood Co. is the refinement of its air-cushion clutch for shovels. This clutch is of the disc type, and is engaged by admitting air to a circular tube. This tube is made



Walking dragline of 25-cu. yd. capacity supplied by Bucyrus-Erie for use in the phosphate field

Scraper-loader of 17.5 cu. yd. capacity made by LaPlant-Choate. A stripping machine used in the rock products field



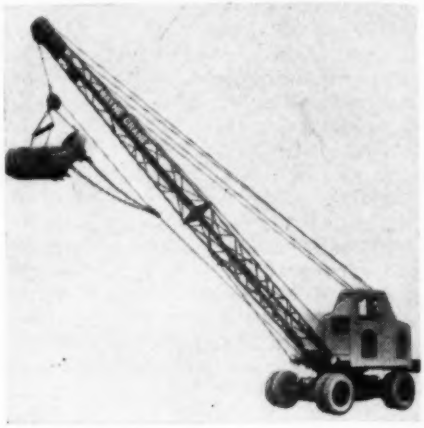
Air-cushion clutch for shovels developed by The Osgood Co.

Cleaning up sand and gravel stockpile with Bucyrus-Erie dozer shovel

of rubber, and is confined between two plates, one of which is movable. When air is admitted, under pressure, the tube expands and causes the floating plate to clamp the friction disc between the floating plate and the back plate of the clutch. By means of metering valves, the pressure can be varied at the will of the operator.

Another interesting clutch development is the Koehring power clutch with booster control which keeps the booster from "taking over" by maintaining direct hand lever control over movement of booster brake.

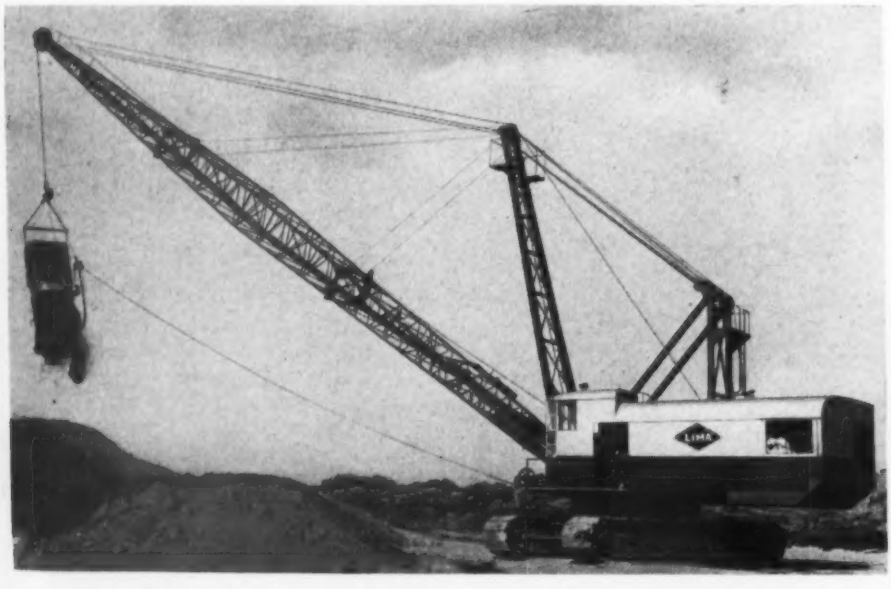
Many improvements have been made in buckets. All-welded construction has cut down weight, and alloy steels have made their construction more rugged. The American Manganese Steel Division, American Brake Shoe Co., has developed a lighter weight dipper comprising interlocking of castings with rabbeted joints and plug welding and using austenitic manganese steel. The patented plug welding of the interlocking castings provides rigidity and also permits replacing worn parts and rewelding when necessary. Another development of American Manganese is the Amsco-Whiler scraper bucket for underground mines. One-piece rigidity is obtained through dovetailed castings that interlock and bind the assembly into a solid unit. These scraper buckets are available in five widths: 66-, 60-, 54-, 48-, and 42 in. The Wellman Engineering Co. has brought out a new line of Williams type, multiple-rope reeved rehandling buckets, known as type MR and type MS. The type MR buckets have extra wide scoops and are adapted for barge and clean-up work, while the type MS buckets have standard width scoops adapted for loading trucks and railroad cars. C. S. Johnson Co. is making an all-welded bucket ranging in size from ⅜- to 2½-cu. yd.



Rapid stockpiling and truck loading with Wayne dragline bucket on 4-wheel drive, dual-tire chassis

Another type of shovel unit which is coming into increasing use is the pneumatic-tired shovel for many stockpiling and yard loading jobs. The American Steel Dredge Co., Inc., has brought out the Wayne crane with four-wheel drive, dual tires, and with a 360 deg. operating range.

Lightweight Amsco dipper with interlocking castings



This 5½-cu. yd. Lima Type 2000 dragline is being used for stripping

¾-cu. yd. rehandling bucket, The Wellman Engineering Co.

HAULAGE

EXPENSIVE pneumatic-tired haulage equipment used in the quarry has made it essential that the roadways to primary crusher hopper or belt conveyor hopper be kept free of pieces of stone which would ruin tires. Tractor-bulldozer units and even road graders have been used to maintain these roads and to keep the area around shovels clean. The dozers also help the shovel operation by pushing stone within reach of the shovel boom.

Capacity of haulage units has been greatly increased. These units comprise large trucks with hydraulically operated end-dump bodies, tractor and semi-trailer combinations with the semi-trailer chassis mounting one or two bodies that side dump or some of the easily maneuverable haulage units that dump forward. All these types have applications for which they are particularly fitted. The side-dump, semi-trailer units are used extensively where the units move over a continuous roadway to the crusher hopper, side-dump, and then move away without backing or turning. Some of the other units are more adaptable where space for maneuvering is limited. The well-known Easton Car and Construction Co. semi-trailer haulage units are an example of the side-dump operation. Euclid Road Machinery Co. manufactures a large capacity haulage unit which employs the end-dump arrangement. Truck Engineering Corporation produces a semi-trailer unit for hauling crushed stone and sand and gravel which end-dumps. The Model 6SF semi-trailer dump unit has a 16-cu. yd. body capable of handling in excess of 20 tons. A haulage unit which is growing in use is the Dumptor made by the Koehring Co. It was developed in the early thirties from an iron-wheeled, 4-cu. yd. rigid piece of equipment into a fast-moving, rubber-tired haulage unit of 6-cu. yd. capacity, models W-60 and WD-60, with 107-hp. Diesel or gasoline engine. Dumping is forward by means of gravity.

In sand and gravel pits, shovels very often have dispensed with any intermediate haulage unit as they load field hoppers over a movable conveyor belt which can be swung in an arc near the source of raw material. This comparatively common practice on the Pacific Coast is being adopted in other parts of the country. Where this is not feasible, the shovel loads trucks for haulage to a hopper having a grizzly or sometimes a scalping screen.

The trend is definitely to the use of long conveyors to the plant. In California, aggregates were moved nearly 10 miles from the plant to the site of Shasta dam, completely exploding the theory of the previously conceived economic limits of conveyor transportation. In quarries, the primary crusher is now placed on or below the quarry floor as close to the face as possible, and a long conveyor moves crushed material (generally from a reclaiming tunnel below a surge pile) to the plant for secondary crushing and screening. In sand and gravel pits where boulders are crushed, a similar set up of crushers and surge piles is found.

There have been a number of belt conveyor improvements, not only in the belting itself but in the idlers. With the end of the war, restrictions on quality belt manufacture have been removed. Goodyear, Robins, Goodrich, and other belt manufacturers have all announced the resumption of production in high quality belting. Rubber cushion idlers have been announced by several manufacturers. Goodyear has developed a cushion type idler consisting of rubber rings mounted on the idler core. The new device is an adaptation of the principle which led to using a battery of pneumatic tires, mounted on shafts revolving in bearings, to protect the belt at dumping points. The use of tires as shock absorbers enables a conveyor belt to withstand impact on operations handling heavy lumps up to 1½-ton size.

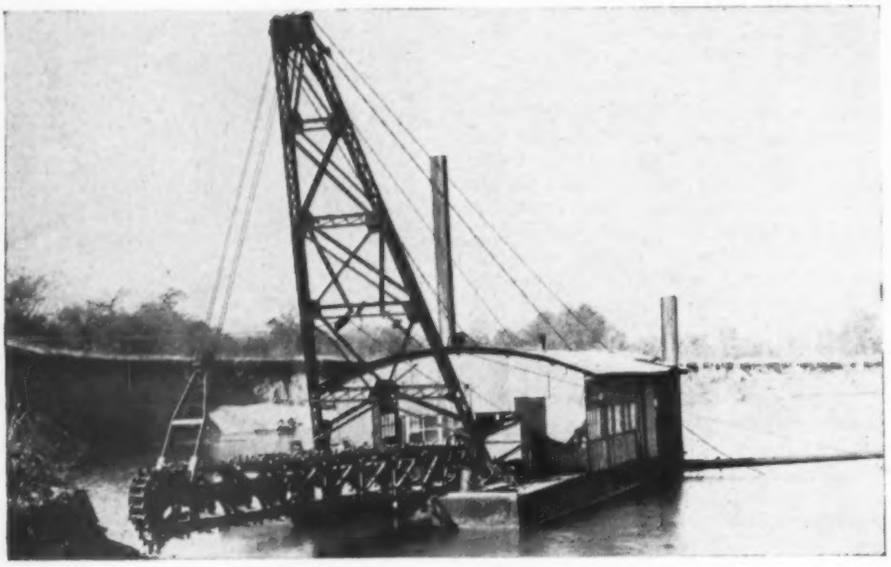
Chain Belt Co. has brought out its Rex No. 35 idler, each roll consisting of a rubber cylinder vulcanized directly to the assembly tube with deep primary grooves for cushioning to guard against belt carcass rupture and shallow secondary grooves to provide surface softness for protection against belt cover laceration. It also is manufacturing a rubber-covered spiral return idler built of a flat-bar steel helical spiral, covered with rubber.

Scraper-loader with 1½-cu. yd. Sauerman Crescent bucket

Kingston Trap Rock Co. uses these large Truck Engineering Corporation bodies to haul crushed stone

Latest type 6-cu. yd. Koehring Dumptor

Traxcavator loading broken limestone in mine to Caterpillar W10 wagon



Light Eagle "Swintek" dredging ladder, 12-in. pipe, 30 ft. long

Both electric and Diesel locomotives are being continued in use where comparatively long hauls in inaccessible terrain is encountered, and also for limestone mine haulage. Even in the case of mines, however, the Diesel truck has been growing in use.

For moving hot materials from a dryer, such as silica sand, a vibrating conveyor is often employed. The multiple vibrations are imparted to the continuous conveyor trough by pulsating driving magnets. The Syntron conveyor is an example of this type.

Dredging

Dredging continues as a major factor in the excavation of sand and gravel. Although no radical changes have been made in equipment, there have been improvements in bucket type dredges for river work, using hard alloy steel in the bucket lips to withstand abrasion. Lighter weight has been sought in ladder structures by the welding and the use of lighter metals where possible. In dredge pumping operations, considerable attention has been given to the design and abrasion-resisting metals in the pumps. Eagle Iron Works has made several improvements in its Swintek cutters to obtain longer life.

American Manganese Steel stresses the use of manganese steel in pump shells, impellers and side plate assemblies to obtain maximum production over a long period of time. The Amsco pump also features the "counterflow" feature where clear water is introduced under pressure at both sides between impeller and pump side plates, keeping away abrasive material at points where greatest wear might be expected and also acting as a lubricant.

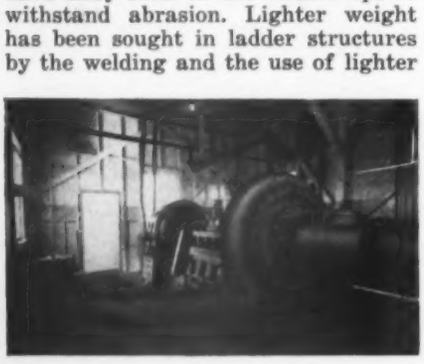
Lawrence Machine and Pump Corporation has introduced a 15-in. sand pump which has been furnished to a mining company to handle a mixture of 35 per cent solids and water. The pump is driven by a 500-hp. motor through a V-belt drive, and provision is made for varying the speed. Pump wearing parts are high carbon steel.

Fifteen-inch sand pump will carry 35 per cent solids, Lawrence Machine & Pump Corp.

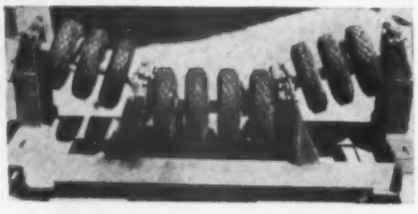
In moving silica sand to the plant for processing and for use in wet process cement plants, centrifugal pumps of comparatively large size have been used. Slurry pumps for cement plants up to 14-in. suction, 12-in. discharge have been built.

Slackline cableway excavators provide another efficient method of excavation and haulage to the plant. These units also are employed extensively in reclaiming from stockpiles. The drag scraper also has been used to remove cement from the holds of cement carrying barges, and in some cases to load trucks or railroad cars from stockpiles. Sauerman Bros., Inc., has designed a new line of two-drum, roller-bearing scraper hoists for standard drag scraper duty, increasing capacity 20 per cent over previous models.

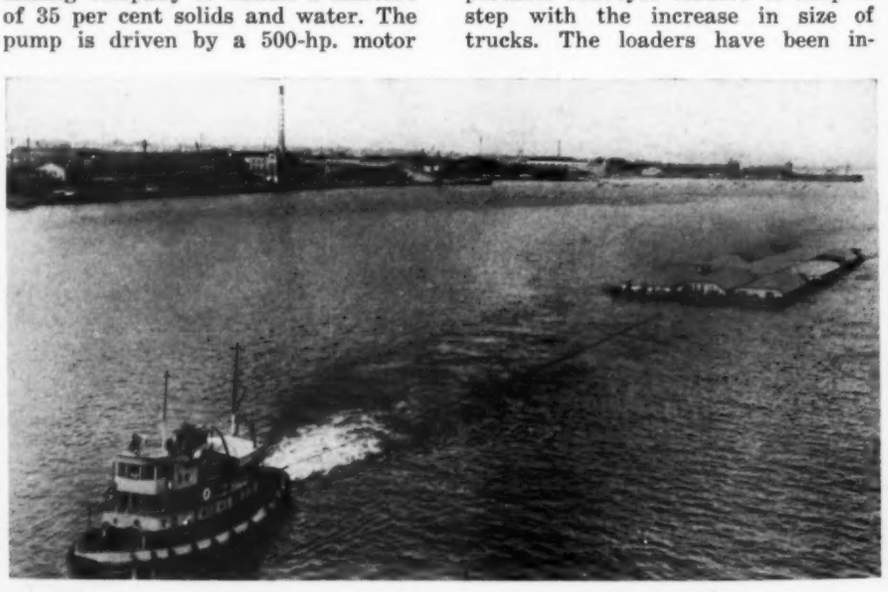
Portable conveyor loaders are almost indispensable around the plant for loading trucks from stockpiles. Both the bucket and belt type are used. The cleated belt conveyor also is employed in moving sacked cement to a higher level. George Haiss Mfg. Co. has changed the design of its portable conveyor loaders to keep in step with the increase in size of trucks. The loaders have been in-



Dredge pump installation is a 12-in. Amsco



Conveyor belt idler, a Goodyear development using pneumatic tires



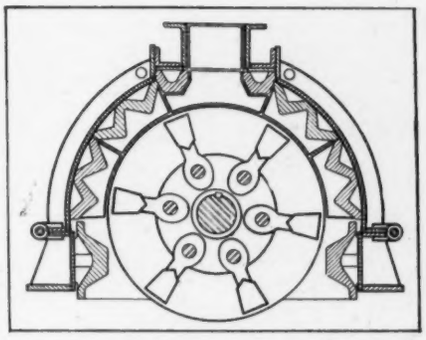
A Warner Company tow of 10 sand and gravel barges moving along the Delaware river to Philadelphia. All-steel barges were built by Dravo Corporation

creased in height, discharge reach, and swiveling radius discharge for bucket loaders. A power-driven hydraulic adjustment of the elevator boom position is also available in three of the models.

Tractor shovel loaders also have increased in use. Typical of these units are the Traxcavator, Athey, Bucyrus-Erie dozer shovel and many others.

Higher freight rates will undoubtedly result in a much heavier movement of finished sand and gravel, crushed stone, and cement by barge and trucks. Trucks will be multi-wheeled units to reduce wheel loads, and semi-trailer and trailer combinations will be used.

An increasing quantity of cement is now moving in special bulk container truck and semi-trailer units. The Permanente Corporation has one unit which hauls a pay load of nearly 52,000 lbs. of cement. Large orders for steel barges by producers are reported in several areas where water transportation is available.



Type of hammermill liners that make the machine more of an impact crusher

Developments In Crushers

By NATHAN C. ROCKWOOD

ONE does not look for anything very new or novel in standardized machines that have been in use for as many years as rock crushers; yet there have been some interesting new developments in the last few years. These consist of two kinds, one, refinements in design of parts to increase strength, reduce weight, increase capacities and reduce the power requirements; and second, new combinations of standard parts which result in crushers designed to do double duty, or two crushers in one. There is a third development which is difficult to classify, consisting of a crusher and feeder combined. The simplest way to discuss these developments is by type of crusher, and the jaw crusher being the oldest, we will take it first.

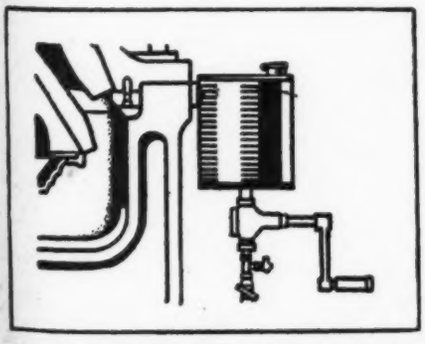
Jaw Crushers

Perhaps the most significant development in primary jaw crushers in the recent past has been the use of ball and roller bearings, which has speeded up their operation by 50 per cent or more. The chief handicap to the more extensive use of jaw crushers was their limited capacity as compared with the same weight in a gyratory crusher. Also, by the use of rolled steel plates and welded construction it has been possible to both increase strength and reduce weights, so that the jaw crusher has gained increased popularity in recent installations.

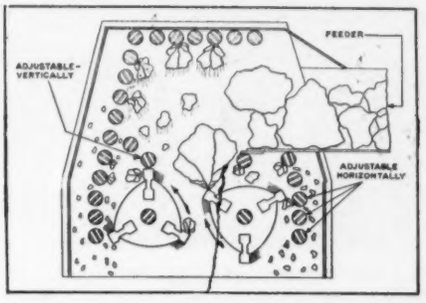
Another improvement in jaw crushers has been redesign of the jaw plates, with curvature on the lower end, or both ends, to prevent choking and thus providing for faster flow of the material through the jaws. Originally the jaw plates were flat planes with more or less square ends, but improvement in design began several years ago and has continued since then, to do a special job in some instances. The long debate over the virtues of corrugated or ribbed jaw plates vs. smooth surfaced plates has also come to the fore again since at least one crusher manufacturer claims greatly increased capacities from specially designed smooth plates.

The large size primary jaw crusher apparently has not been changed much in design other than to improve lubrication and reduce over-all weight. The original Blake mechanical movement has never been improved upon except in stronger and better designed parts. The idea of a pitman or plunger operated by an eccentric for widening the angle between two toggle plates to produce great pressures is the one used today in machines for molding steel automobile parts. In the Blake type crusher the movable jaw is hinged at the top, and there is no movement back and forth except such as may result from the rolling motion of the top of the liner plate. The eccentric which actuates the pitman is mounted on a separate shaft, and the two piece toggle has bearings near the bottom of the movable jaw. Thus the jaw movement is maximum at the bottom and nil at the top. This type is still universally used for large primary crushers handling hard, tough rock.

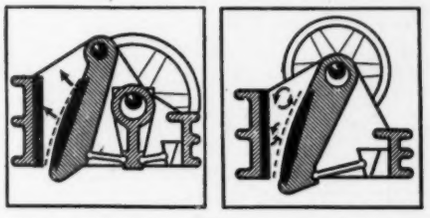
There are also crushers operating on the Blake principle, but with the hinge for the movable jaw higher than usual, which, of course, permits a longer jaw, with the liner plates placed lower, so that there is some back and forth motion at the entrance of the crusher opening. One manufacturer uses a curved jaw frame, so that the line of jaw suspension passes through the center of the crushing zone, which is said to give the jaw more of a crushing or squeezing action rather than a rubbing one, and



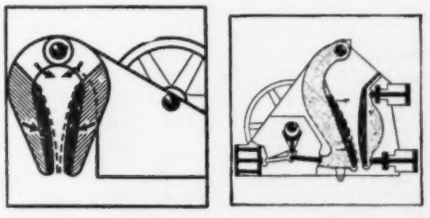
New hydraulic device for quickly changing the setting of a gyratory crusher



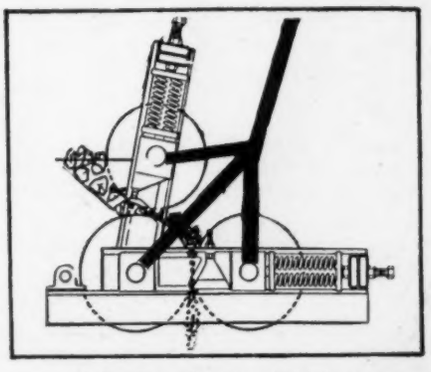
Hammermill type crusher with opposing "impellers"



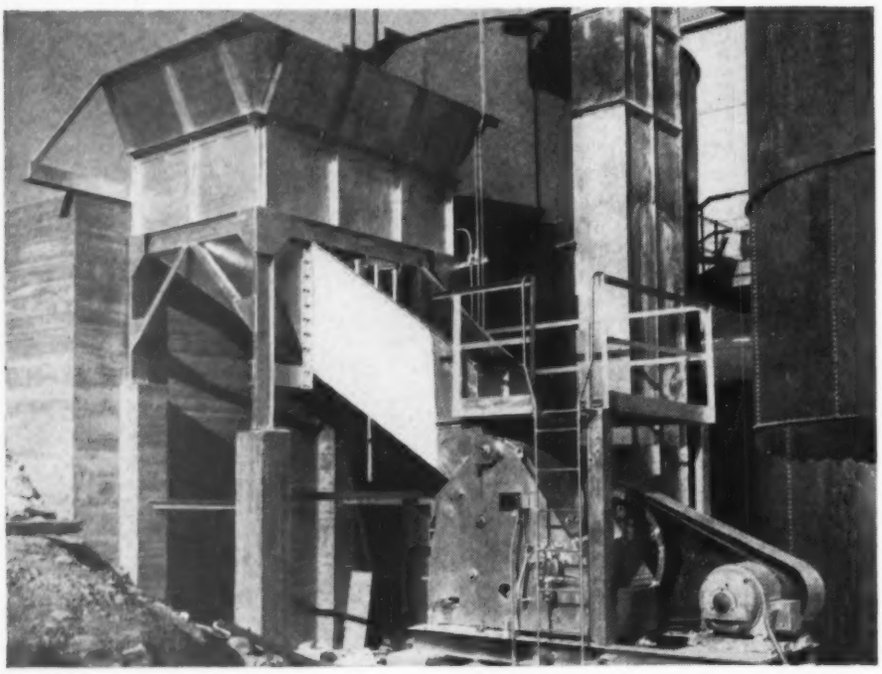
Two standard types of jaw crushers; most of the new developments have been in type shown at the right



Two departures of standard types



A 3-roll crusher, or a 2-in. type



Interesting installation of Kue-Ken primary crusher in a limestone plant

thus gives longer life to the crushing plates. The same manufacturer and at least one other also make a crusher with two hinged jaws facing each other, operated by independent mechanisms so that one is approaching while the other is receding.

The recent developments in jaw crushers are chiefly confined to the type in which the movable jaw itself is suspended on the eccentric bearing and serves the purpose of a pitman. The toggle is a single plate kept in position by coil springs. This type of jaw crusher was originally introduced as a secondary or recrusher, because the maximum opening and closing movement of the jaw is at the top, while the opening at the bottom does not change much, so that the crushed product is more uniformly sized than in the case of Blake type crusher.

By raising the point of suspension of the jaw and its eccentric, and in some instances increasing the length of the jaw, the movement at the top may be increased and the opening and its angle of nip correspondingly increased. This, and the spherical roller bearings on the eccentric, permit larger sized intake and increased capacity, as well as wider feed openings, so that the crusher has been widely adopted as a primary breaker in many small operations. It appears to be particularly adaptable to portable crushing plants, whose manufacturers are largely responsible for the recent developments of this particular type of jaw crusher.

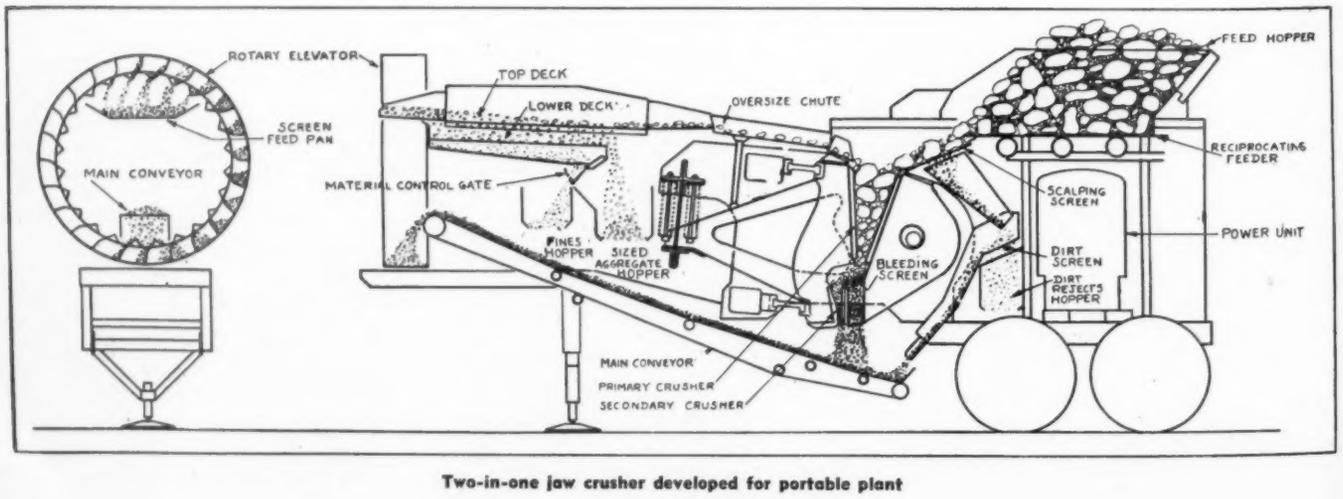
Gyratory Crushers

There have been no radical changes in gyratory crusher design since the development of the cone type a number of years ago. The fundamental difference between the standard gyratory crusher and the short-head cone or spherical head crusher is in the method of suspension of the gyrating central shaft which carries the mantle. In the standard gyratory this shaft extends into a bearing above the crusher apron or opening. The top of this shaft is slightly conical to permit the small gyratory motion in the end of the shaft. The eccentric sleeve which imparts the gyratory motion, in which the center shaft carrying the mantle is free to turn, is below the mantle, in most instances near the bottom of the shaft.

It is plain to one who is familiar with the operation of the mechanism that the farther below the mantle the eccentric sleeve is, the less will be the gyratory movement of the mantle. That is, the maximum movement will be at the lowest point of the shaft and it will decrease the higher up you go. Therefore, there is added crushing movement the shorter the shaft. To overcome the bearing problem that would result from a socket bearing at the top end of the shaft, the head is a floating one with no top bearing, in the case of the cone type crusher. The weight of the shaft and its mantle instead is carried on a bearing below the mantle. This type of crusher is designed for secondary and fine crushing. Its adoption led to the withdrawal from the market of the disk type crusher, no longer made, although many are still in use.

The demand for fine crushing with standard type gyratories led to extensive studies of the shapes of the concave and mantle plates, with the result that capacities on finer materials were much increased, and it is now possible to get mantle and liner plates especially designed for the particular product to be made. Such plates are available for use in all types and makes of the ordinary gyratory crusher.

With the variety of accurately sized products called for in the modern commercial aggregates plant, it became necessary to make frequent adjustments of the crusher opening, not only to take up wear, but to make new



Two-in-one jaw crusher developed for portable plant

sizes. This has led to ingenious devices for readily adjusting the crusher opening, which in the original gyratory crusher was a rather laborious job of raising or lowering the central shaft and its mantle.

While none of the improvements noted are new in the sense that they are post-war developments, no review of crusher design would be complete without reminding operators and prospective operators of the fact that there has been and is gradual development all designed to fit the crusher to its particular job. One no longer buys a crusher simply to "make little ones out of big ones," but to make some special size or product with the least waste, of product, of power, and of investment cost tied up in pounds of steel.

Hammer and Impact Crushers

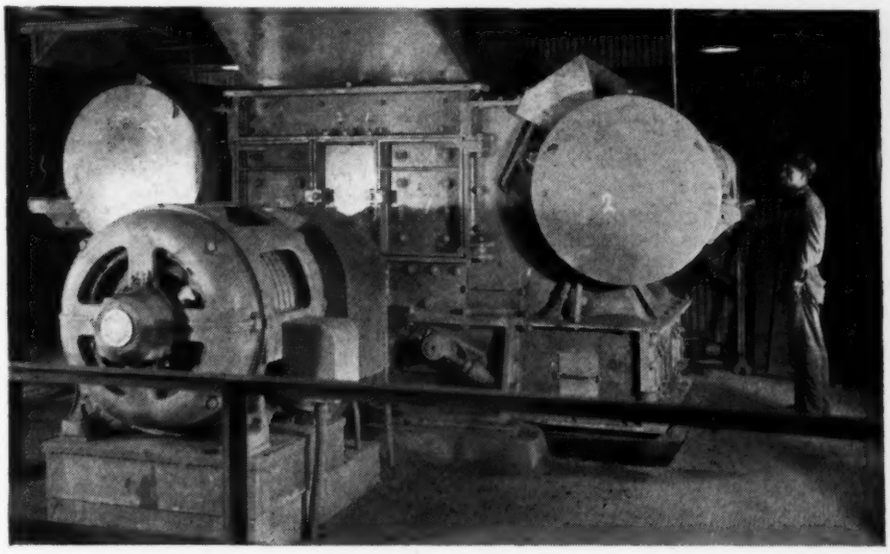
There is some confusion in the distinction between the hammermill type of crusher and the true impact crusher, which is understandable because hammermill crushers do considerable of their work by impact. Strictly speaking, however, a true impact crusher is one in which rapidly revolving blades catch the material fed to them and throw it practically horizontally against a breaker plate somewhat removed from the blades. The material is therefore broken by the impact of being thrown against the breaker plate, although, of course, if the material is readily fractured some will be broken by contact with the revolving blades. It is used always as a fine crusher, and properly designed and operated probably offers some possibilities in the puzzling problem of the elimination of "soft" particles —that is, it could possibly be operated at such speeds as to shatter the softer aggregate particles without loss of the harder ones. The speed of the blades, however, is definitely tied up with the falling velocity of the entering particles, so that this problem is a complicated one.

The manufacturers of hammermill type crushers, on the other hand, have often converted their crushers into at least part impact machines by the type of lining and hammers used in the mills. If this lining is rough or angular so that the particles of rock are held on it, or delayed in sliding down, it is obvious that the revolving hammers will hit them against an "anvil," and the particles will be broken by impact rather than abrasion or rubbing them between the hammers and the lining or screen bars. In any hammermill with the hammers revolving at high speed, some of the particles will be shattered by being thrown against the liner plates or bars, as well as crushed by the hammers against the liners.

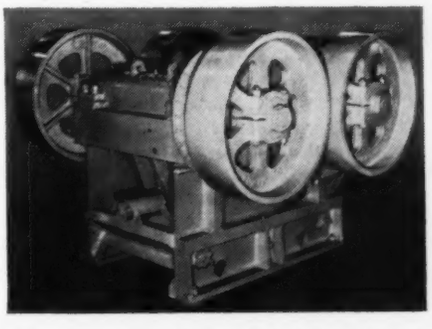
One manufacturer has built a hammer-impact type of crusher which has two "impellers" or sets of revolving hammers, which revolve in opposite directions—that is, both are turning upward toward the incoming feed. Thus any large particles caught between them are forced upward and made subject to rapid hammer blows until they are fractured and the pieces thrown outward against the grate bars on either side. They can not drop between the impellers until reduced to size, but most of them fall outside the grate bars or between the grate bars and the hammers.

The chief other development in the hammermill type crusher industry is the expiration of the original patent on the moving breaker plate. As a result, several manufacturers have now equipped their crushers with some form of moving breaker plate, which makes the crusher particularly effective for handling wet and sticky materials.

One manufacturer's fairly recent improvement in hammermill crushers, is to make the shaft and hammers so that they may be revolved in either direction. This, of course, lengthens both the life of the hammers and of the liners.



Large 42- x 50-in. Jeffrey impact crusher with traveling breaker plate on each end. Both plates are adjustable with relation to the distance from tip of hammers, making it possible for one size product to be run on one side of the machine and another size to be obtained by reversing rotor



Twin jaw crusher developed by Iowa Mfg. Co.

Roll Crushers

Crushing rolls are probably the oldest type of crusher made, and in their proper place, one of the most efficient. Aside from improvements in mounting, adjusting and driving roll crushers, the only notable development in recent years is the three-roll crusher, designed to do the work of two pairs of rolls, or two roll crushers. Since the angle of nip is the limiting factor in the size of material that can be fed to rolls, if the primary rolls are designed to take the coarsest possible feed, the reduction may not be enough for the finished product, so one manufacturer added a third roll which, operated in conjunction with the lower roll of the primary crusher, makes a second reduction.

Combination Crushers

The idea of making more than one reduction in a single machine has also been developed by the manufacturers of both gyratory and jaw crushers. A combination jaw crusher is now made using the Dodge principle of imparting the crushing movement to two sets of jaws—one for primary crushing and one for reduction or secondary crushing. In the Dodge type jaw crusher, which also is very old, the movable jaw is carried on one side of a rigid triangular frame, hinged at the lower corner. The apex of the triangle, which is in a horizontal position, moves the jaw frame back and forth, on a pin bearing at the bottom, by action of an eccentric on the drive shaft. The maximum movement of the jaw is at the top, the movement of the bottom depending on how far below the breaker plates the jaw hinge is placed.

Another type of combination crusher has a jaw crusher above and rolls below. Both these crushers were de-

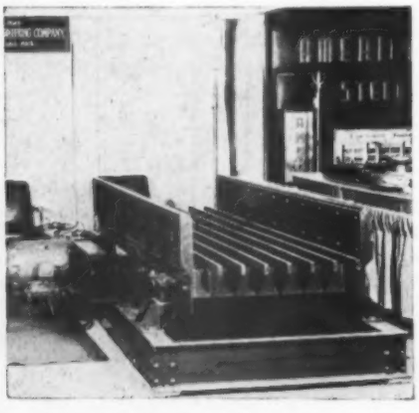
Suspended type, 3- x 6-ft. single-deck Denver Dillon screen

veloped by portable plant manufacturers to fill the need of compact machines with maximum capacity for producing finished products.

A manufacturer of gyratory crushers, not to be outdone, has built a combination machine with two mantles and two sets of concaves, one above the other, on the same shaft, to do the work of two crushers.

We have no record of the experience with any of these combination crushers, and so far as is known they have not been very extensively used, with the possible exception of the three-roll crusher. Since there can be no way of bypassing the secondary crushing unit, such as a scalping screen in a circuit where two separate crushing units are used, it would appear that the capacity of a combination unit would be limited to the capacity of the fine crushing part of it.

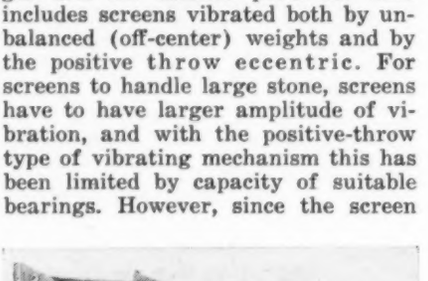
At least two manufacturers have utilized the possibility of combining a shaker type feeder with a jaw crusher. In the case of the new high-speed jaw crusher with the eccentric on the jaw hinge, it is not difficult to transmit the oscillating movement to a feeder at the same time it is moving the jaw, as is done by one manufacturer. In others, the feeder is more or less a standard type which can be partly supported by the crusher frame and driven from a pulley on the crusher flywheel. Obviously, the feeder could be made a scalping screen.



Heavy-duty Simplicity scalper

Developments In Screens

EVERY YEAR sees the field for use of vibrating screens in the rock products industry extended—both for bigger and for smaller products. This includes screens vibrated both by unbalanced (off-center) weights and by the positive throw eccentric. For screens to handle large stone, screens have to have larger amplitude of vibration, and with the positive-throw type of vibrating mechanism this has been limited by capacity of suitable bearings. However, since the screen



Two-bearing, heavy-duty Telsmith vibrating screen

itself actually goes around the same orbit as the eccentric, there is a limit to the speed of vibration. Screens of this type are made now up to 7 x 12 ft. to scalp boulders as large as 10-in. diameter, with apparently about 1200 r.p.m. vibrations.

On the other hand a new screen using a special design of off-center weights is now manufactured in sizes up to 6 x 14 ft. with double and triple decks. The manufacturer describes this screen as having "automatic centrifugally actuated counterweights" designed to eliminate objectionable vibrations usually encountered through critical speed ranges in accelerating and decelerating screens which are actuated by fixed counterweights and large amplitudes of vibrations. The exact method of accomplishing this is not divulged; but apparently it is a mechanism by which the centrifugal force of the weights is increased as the r.p.m. increases as it could be by weights which would move outward with increased speed, and inward when the speed decreased, as is the case with a steam-engine governor.

The exact method employed in this case is not important to this brief discussion. The important point is that methods are being developed to increase the size and weight of screens, so that they are now capable of replacing rotary screens even for the heaviest and coarsest of screening.

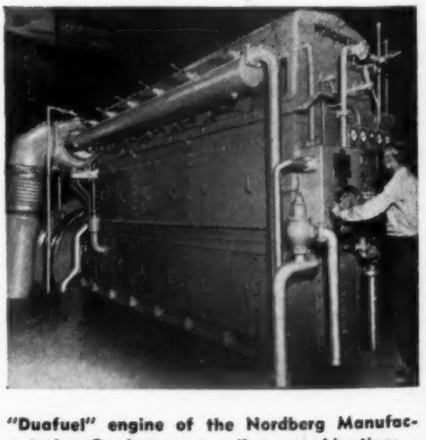
Similarly, progress has been made in screening constantly finer materials by higher speeds of vibration and the use of much water.

POWER

DIESEL POWER driven equipment in the rock products field has moved in step with field applications. The first Diesel built in this country was in 1898. By 1915 some 100,000 hp. was produced. In 1940 close to 3,500,000 hp. appeared, and in 1944, a war year, production rose to the all-time high of 30,000,000 hp. Applications in the rock products industry, judged solely from field observations followed somewhat these numerical trends.

In this country Diesels are being built from 5-hp. up to around 25,000-hp., but the great majority numerically are in horsepower ratings applicable to such equipment as shovels, tractors, trucks and other haulage units, compressors, and for prime movers in portable plants. Large unit installations have been in cement plants, crushed stone plants both for prime movers and for stand-by purposes. Boats of the self-unloading type, tow boats for water borne rock haulage has accounted for considerable usages. Naturally one assumes that larger Diesel installations have taken care of isolated plants which is all true but in many instances in this field, large Diesel units have gone into plants located near the heart of some of our industrial districts. An 850- and a 400-hp. supercharged Superior Diesel went into a limestone plant in Illinois. Similarly the Lehigh Portland Cement Co. at its Iola, Kans., plant installed this year a six cylinder, 1220-hp. Nordberg Mfg. Co., Milwaukee, Wis., gas-burning Diesel. This is a duafuel engine and burns either oil or gas or any proportions of either fuel.

In the transportation field relatively



"Duafuel" engine of the Nordberg Manufacturing Co. burns gas, oil, or combinations

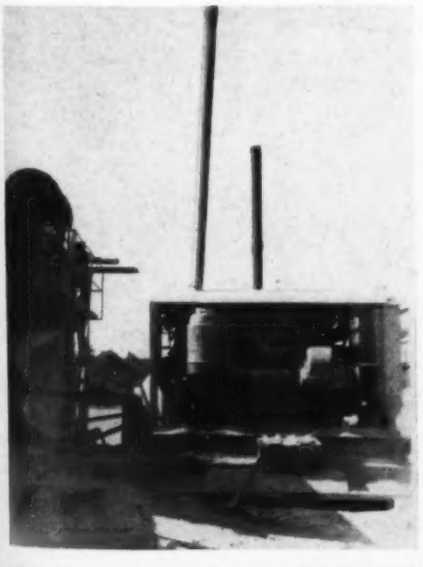
large Diesels have firmly established themselves in switching engines for use in and about rock products plants. Trucks of late design have practically all been Diesel equipped. For heavy-duty shovels and drag lines Diesel driven units have found great favor in our industries as these units are fast, dependable and have many operating economies. Many operators are very outspoken in their praise of Diesel equipped shovels.

Over the years, progress of mechanical fuel injectors tandemed with other factors, have tended to increase the speed of Diesels with proportionate increases in horsepower and without increases in size and weight. The amount of increase in speed now and for the future possibly will depend largely upon the types of steel and construction materials available.

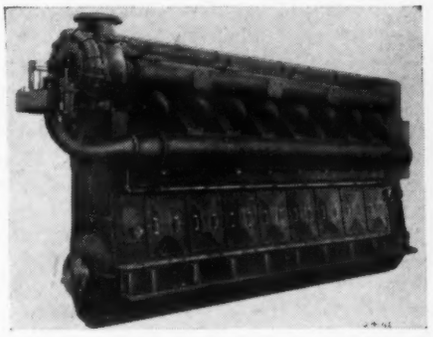
Diesel speed ranges in modern units from 75 r.p.m. up to as high as 3000 r.p.m. They are being built to run on four-stroke or two-stroke cycles, single or double acting, or, as opposed piston types. Cylinder combinations range from one to 16. They are of the straight-in-line type, radial, and "V" type.

The war pushed the use of supercharging so that now most of the slower speed engines are supercharged to increase speed. Fairly large engines weighing 35-40 lbs. per hp. are available, and engines for some services have been reduced to around 18 lb. per hp. With the higher rotative speeds and greater pressures from supercharging, the top economical limit for 4-cycle engines, according to some authorities, can advance into the 3000-hp. fields. Supercharging is said to have increased the horsepower of heavy duty 4-cycle engines as much as 60 per cent.

One of the latest steps in Diesel power is the Diesel-gas turbine combination. Under this scheme, the Diesel



This Murphy Diesel is driving equipment used to produce aggregate in Maine



A 1310-hp. at 327 r.p.m. Diesel made by Superior Engine Division of the National Supply Co.

(along with a compressor) becomes a gas generator that supplies high pressure exhaust gases to the turbine. This latter item then becomes the prime mover. The pioneering work for this power trend was done in Switzerland.

During the past several years some manufacturers have developed Diesels that will use gas or oil or mixtures thereof for fuel. The Cooper-Bessemer Corporation, Mount Vernon, Ohio, with the former types have made fuel economies as much as 20 to 25 per cent with this type of non-electrical firing unit.

The Climax Engineering Co., Clinton, Iowa, besides its line of gas engines, has the V-12 Blue Streak engines in r.p.m. ranges from 600 to 1200 at 435 hp. It burns natural gas, butane, gasoline and other fuels with quick change over accessories.

Individual Power Units

Standardization of Caterpillar Diesel-electric units has been one of the main contributions to this field by the Caterpillar Tractor Co., Peoria, Ill. Interchangeability of parts, fuels, and lubricants has been one of the reasons for the widespread uses of this equipment. These Diesels are noteworthy for their dependability, compactness and the general reliability of servicing in the field.

It is more or less well known that some of the difficulties in operating Diesels are due to the extremely high pressures in the cylinders. The Buda Co., Harvey, Ill., stresses its "Slow Pressure," 4-cycle Diesel combustion system that results in low peak cylinder pressures and also more complete combustion. The lower pressures produce less damaging effects on pistons, rods, bearings and other working parts.

The Cummins Engine Co., Inc., Columbus, Ind., has found excellent service and production results in the use of its Diesels in the 20- and 30-ton Euclid and Mack trucks now being used in some of the larger open pit operations.

Diesels made by the Murphy Diesel Co., Milwaukee, Wis., have proven very rugged as well as popular and several of its engines were in use in the aggregate plants supplying material to the Maine Turnpike. Most of these aggregate plants were somewhat remote from industrial centers.

West Coast Diesel manufacturers have been active in the rock products field with such companies as the Lorimer Diesel Engine Co., Oakland, Calif., producing Diesels in the 20- to 200-hp. range around speeds of 600. Joshua Hendy Iron Works, Sunnyvale, Calif., has 6- and 8-cylinder models with horsepower ratings from 190 to 250 at 900 r.p.m.

During the past year, International Harvester Co., Chicago, Ill., came out with a 125-hp. and a 76-hp. model Diesel for heavy-duty work. These engines retain the internal gasoline starting systems. Engines are started on gasoline. After a brief warm-up, the engine, by a single lever movement can be changed to a 4-cycle Diesel operation.

The 71 series of Diesels of the General Motors Corporation, Diesel Engine Division, Detroit, Mich., uses the Roots type helical blower to supply clean air under pressure. By the use of the blowers, 2-cycle engines result in units producing 1-hp. per 17 to 20 lb. weight. The company also brought out improved models of its series 7, Twin 6 engines with B.H.P. at 1800 r.p.m. of 276 and which have an intermittant rating of 400 hp. at 2000 r.p.m.

In the Diesel-electric field, one manufacturer of heavy-duty switching units used two of the Hercules Motors Corporation, (Canton, Ohio) Diesels as the prime movers.

Packing

THERE have been no major developments in packing machinery used in the rock products industry, except in the matter of increased bagging capacity and refinements of design. The

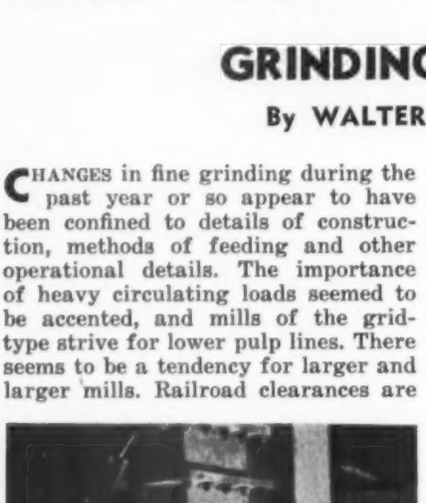
Showing how easy it is to open rip-cord bag closure

Bates and Modern bagging machines are used almost exclusively in this field except for some hand-operated machines where smaller lots are packed or where smaller bags are used. Manufacturers have announced unofficially that plans are now nearing completion for bagging machines with some outstanding improvements over models now in service. These models are designed to provide a quicker and more accurate cutting off of materials going into the bag, and also the use of parts which would better withstand abrasive materials, such as finely ground silica.

GRINDING-FEEDERS

By WALTER B. LENHART

CHANGES in fine grinding during the past year or so appear to have been confined to details of construction, methods of feeding and other operational details. The importance of heavy circulating loads seemed to be accented, and mills of the grid-type strive for lower pulp lines. There seems to be a tendency for larger and larger mills. Railroad clearances are



Syntron feeders like the one shown are in many rock plants

the deciding point when larger diameter mills are considered. Cement plants, as would be expected, used the largest mills.

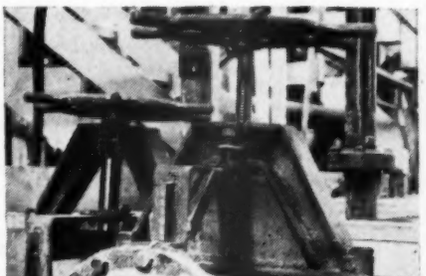
Deliveries of heavy grinding equipment have been slow due to steel shortages and labor conditions. With many companies it is not a question of selling but of delivery.

Four grinding mills recently built by Nordberg Manufacturing Co. set two records for size. Two wet grinding ball mills, 10 ft. 8 in. inside diameter by 17 ft. long, built for Missouri Portland Cement Co., are said to be the longest mills of this diameter ever built. Railway clearances have prevented manufacturers exceeding 10 ft. 8 in. diameters.

Two 9 ft. 6 in. inside diameter by 32 ft. long two-compartment dry grinding mills built for consolidated Cement Co. and for Trinity Portland Cement Co. also set a record for length.

Application of ball mills and similar pieces of grinding equipment is not confined to obvious, every day, fine grinding problems. Years ago the ball mill was introduced into several sand and gravel plants as a scrubber and to grind out the softer rock particles. The use of such mills as the Hardinge mill in phosphate work and in the beneficiation of high grade silica sands are not only successful installations but an interesting departure from standard practices.

Another use for fine grinding equipment in the sand and gravel field stems from the increased demand for sands of all grades, especially sand for concrete block manufacture. In some sections this increased demand for sand has led to the use of rod mills to grind gravel into concrete sands. Two installations are now in use, one at the Radum plant of Henry J. Kaiser and the other at one of the plants of the Pacific Coast Aggregates Co. in



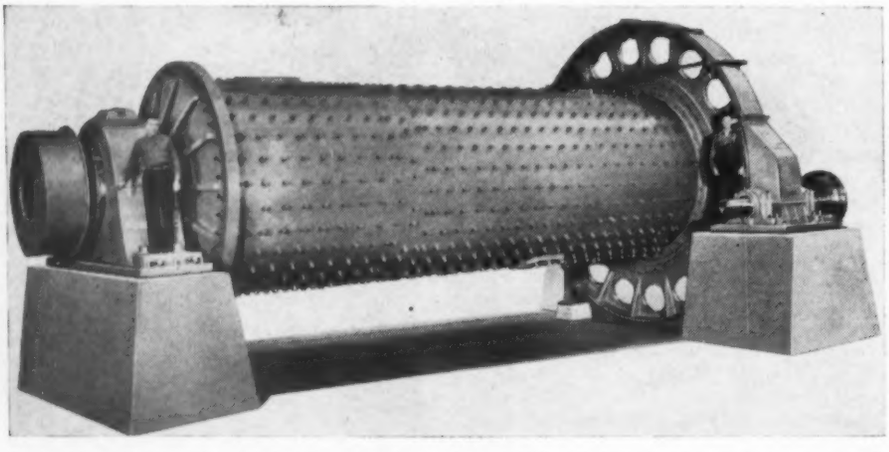
This 10-in. pinch type valve made by Mine and Smelter Supply Co. controls slurry

California. A Portland, Ore., producer and another in Arizona have sand grinding installations on schedule. A large dam under construction in Oregon will install a ball mill to prepare sand from the excess gravels produced locally.

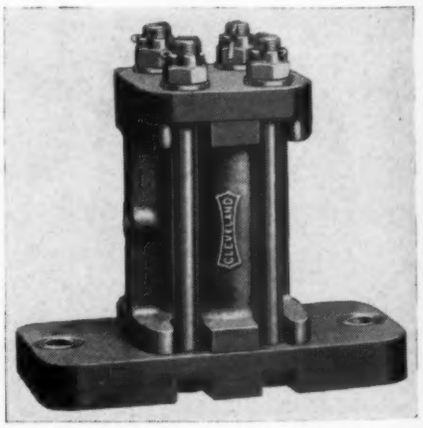
The Mine and Smelter Supply Co., Denver, Colo., has built an 8- x 12-ft., center peripheral discharge Marcy rod mill that will be the second installation for the Pacific Coast Aggregates Co., and will go into its new plant now under construction at Elliott, Calif. Indications are that rod mills of this type will show about 75 per cent more capacity over the end-discharge type mill and also show a considerable saving in rod consumption.

The introduction into cement plants of the Massco-Grigsby rubber pinch valve for controlling flow of slurries ahead of tube mills has met with considerable success. One of these 6-in. valves was installed on the under-flow of a hydro-separator handling an abrasive pulp and after passage of over half a million tons of solids was still in excellent condition.

RAYMOND mills went into the new $8,000,000 gypsum calcining plant for pre-calcining grinding now being built



This two-compartment Nordberg Manufacturing Co. mill is 9-ft., 6-in. (I.D.) and 32-ft. long and longest mill of this diameter ever built



Vertical heavy-duty vibrator of the Cleveland Vibrator Co. is very suitable for bin feeding

on the Atlantic coast. Allis-Chalmers tube mills will re-grind the stucco for the sacked trade. The ball mill additions that went into the Oswego plant of the Oregon Portland Cement Co. were so extensive that the plant is practically new. An installation of No. 2411 Unidan Mills of F. L. Smidth & Co. was made on the wet, raw side with similar mills for the clinker.

The two cement plants being built by the Ideal Cement Co., one at Devil's Slide, Utah, and the other at Portland, Colo., will both use 9-ft. 6-in. by 13-ft. 2-in. single-compartment Traylor ball mills on the raw side and for grinding clinker there will be 8- x 40-ft., 3-compartment, mills of the same make; four mills in all.

Ball mills of smaller capacity have been introduced by the Straub Mfg. Co., Oakland, Calif. This mill has found many applications in the mining industry, and is one of the few mills in which the oversize returns back to the ball mill without the use of extraneous equipment.

KENNEDY-VAN SAUN MANUFACTURING AND ENGINEERING CO., New York, has installed in the cement industry several of its air-swept ball mills for direct firing rotary kilns. Advantages claimed are extreme simplicity and low maintenance costs. The Penn-Dixie Cement Corporation has installed several units.

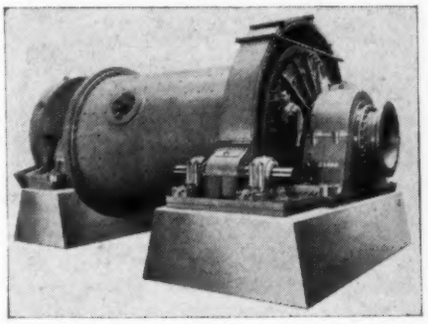
Standard center discharge and grid type ball mills of relatively small dimensions are being fabricated by many manufacturers throughout the United States. As practically all of these smaller units are basically similar, their use in our industries is no novelty. The same could be said for many grinding mill feeders of the continuous belt, pan, and reciprocating types.

Feeding Problems

Feeding materials to ball or tube mills as well as other types of fine grinders is not only a problem of constant uniformity, but operators are asking for equipment that will do this job and at the same time give a reliable figure as to how much is being fed. The Merrick Scale Mfg. Co., Passaic, N. J., is finding considerable use for its Feedoweight in this field. This same unit or groups of units can be used for continuous proportioning and blending of two or more materials such as gypsum and clinker in the cement industry. Each Feedoweight is equipped with an automatic totalizer to continuously record the weights of all materials regardless of the frequency in changes of the predetermined rates of feed.

For feeding practically any sized (or amount) of material to screens, grinding mills, or for blending purposes, the electric vibrators of the Jeffrey Mfg. Co., Columbus, Ohio, are finding extensive use as exemplified by ten such units at the new plant of the Superior Sand and Gravel Co., Superior, Ariz. At the new oil-shale experimental treatment plant of the U. S. Bureau of Mines at Rifle, Colo., these feeders are used for blending three grades of oil shale to produce a grade of around 30 gal. of oil per ton of rock. Gibbons and Reed on the Maine Turnpike have several in their bituminous concrete plants. For real heavy-duty vibration the New England Lime Co. has two units on the vibrating grizzly ahead of the primary crusher.

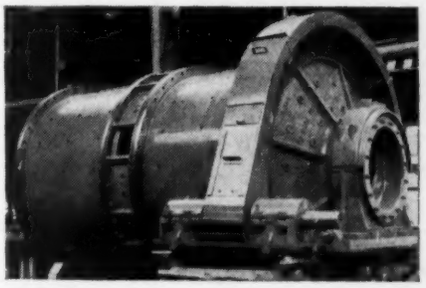
Heavy-duty vibrators made by Jeffrey Manufacturing Co. are used to energize a vibrating grizzly at an Eastern lime plant



Ball mill made by Nordberg Manufacturing Co. is 10-ft., 8-in. by 17-ft. long and longest mill of this diameter ever built

Mosher Electronic Controls, New York, N. Y., has a feed regulator that, it is claimed, can be applied to ball mills, hammer mills or any similar type of grinder in which the load in the machine is directly or proportionately reflected in the motor operating the machine. The Mosher Control takes its signal from the load on the motor which operates the equipment for which the feed is to be controlled. When the load rises above the predetermined maximum, the feed is momentarily shut off. When the load in the mill has dropped, the feed automatically starts.

The Syntron Co., Homer City, Penn., has adapted its bin vibrator equipment to many types of mill and screen feeders in sizes to meet most all commercial needs from the largest to the smallest. The use of Syntron feeders is almost standard equipment for feeding small amounts of materials such as glue, sizers, fillers and similar materials for manufacturing wallboard, and for the blending of various ingredients ahead of the mixer or sacking machines in many rock products industries. Syntron vibrating equipment is being used as a concrete vibrator on one of the late models of automatic concrete block manufacturing machines. The simplicity and ease of installation of this type of machine for feeding dry materials lends itself to ball, tube, or rod mill work as well as for other types of grinders.



This large Marcy rod mill is fed at both ends and discharges through ports in the center of shell. Mill is used for grinding gravel to sand

The Hardinge Co. constant weight feeders are finding extensive use. The Oswego plant of the Oregon Portland Cement Co. uses two of these units ahead of the Unitan primary ball mills in its new additions.

THE CLEVELAND VIBRATOR CO., Cleveland, Ohio, has redesigned its vibrator to include hard chrome plating on the moving parts to ensure longer life. The Type "F," Vertical Mount vibrator is now obtainable in larger sizes than ever before, and it is recommended for speeding the flow of materials, or for preventing the arching of materials in storage hoppers regardless of size of the hopper. The vibrator is also being used to conduct fatigue tests on finished assemblies.

Transmission Belting

HEWITT RUBBER DIVISION, Hewitt-Robins, Inc., Buffalo, N. Y., has announced improvements in its line flat transmission belt with current production featuring the return of Monarch Amber belting that was restricted during the war. In addition to this brand, the company is producing Monarch Neoprene, Sagamore and Ajax.

All-Position Electrode

WILSON WELDER AND METALS CO., INC., New York, N. Y., has announced an improved Wilson No. 512 all-position, mild steel electrode designed to produce weld metal possessing good mechanical properties, but also low hydrogen content. It can be used on a.c. and d.c. reverse polarity with equally good operating characteristics.

HYDRAULIC EQUIPMENT

THE ROCK PRODUCTS INDUSTRIES have been confronted with very pressing operating problems in connection with recovery, washing, classification and the beneficiation of their products. Certain of the problems are mandatory of solution in order to comply with specifications; others are just as pressing where there is a desire to extend markets that depend upon improvement of product for their development.

In the sand and gravel industry, the retention of fines—up to 3 or 4 per cent of the minus 100-mesh particles—and greater quantities minus 50-mesh, while retaining specified percentages of particle sizes between the coarser sieves, continues a perplexing problem. Progress is being made toward its solution by the application of hydraulic principles. Much has been written the past several years in ROCK PRODUCTS on the practical plant solution of the problem so, herein, we merely touch upon a few highlights and consider very briefly a few of the newer commercial equipment developments related to the problems of recovery, classification, washing and dewatering.

Two of the newest devices are the sand classifier and dewatering belt conveyor developed by the Fred T. Kern Co. The classifier, of inverted pyramid type, is best understood by a study of the accompanying drawings showing a single unit in detail and three units set up for series operation. Its design is based on correct length of weir to slow overflow current velocity, the minimization of turbulence with its detrimental effects in hindering the settling of fines and the maintenance of a controlled depth of bed within the classifier. The lower the level, the more fines that may be recovered.

One of the interesting design features of the classifying tank, which is a settling tank also, is the diaphragm arrangement which controls a float which in turn operates a controlled motor-driven gate. Purpose of this design is to prevent flushing and to control free water in the discharge. The baffle (see drawing) is adjustable to minimize turbulence. The valve is set to maintain a low level of bed in order that the tank will discharge at the maximum opening all the time and a slide gate is employed to prevent sticking. When adjusted and in balance in plant operation, the valve will be open for continuous discharge and the float's function is to compensate for variations of flow into the tank.

The Kern dewatering conveyor, also illustrated herewith, is another recent development and one that has just gone into operation in a midwestern sand and gravel plant. This piece of equipment has been designed for dewatering any wet material that must be handled by regulation plant conveyors and other equipment and can be used to take the discharge direct from units like the aforementioned classifier.

It is a slow-traveling belt conveyor with a small hopper at the feed end. Drive is variable speed, the incline is adjustable but usually about 10 deg. for handling sand and the principle consists basically of building up an 8- or 12-in. depth of bed on the belt which is confined between skirtboards which thus becomes a filtering bed. The speed of the belt must be slower than the speed with which water will flow back by gravity.

Units are available in variable lengths and widths and in capacities of 25 to 200 t.p.h. A 24-in. width will handle 80 to 100 t.p.h. depending upon the product. Speeds range from 20 to 50 f.p.m. Water filtered out is trapped in a gutter and may be reclaimed by pump back into the plant for re-use.

This short conveyor is said to reduce free water to 1½ per cent. With an optional vibrator attachment, to speed the separation of water from carried material, it is claimed that free water may be reduced to ½ of 1 per cent upon discharge.

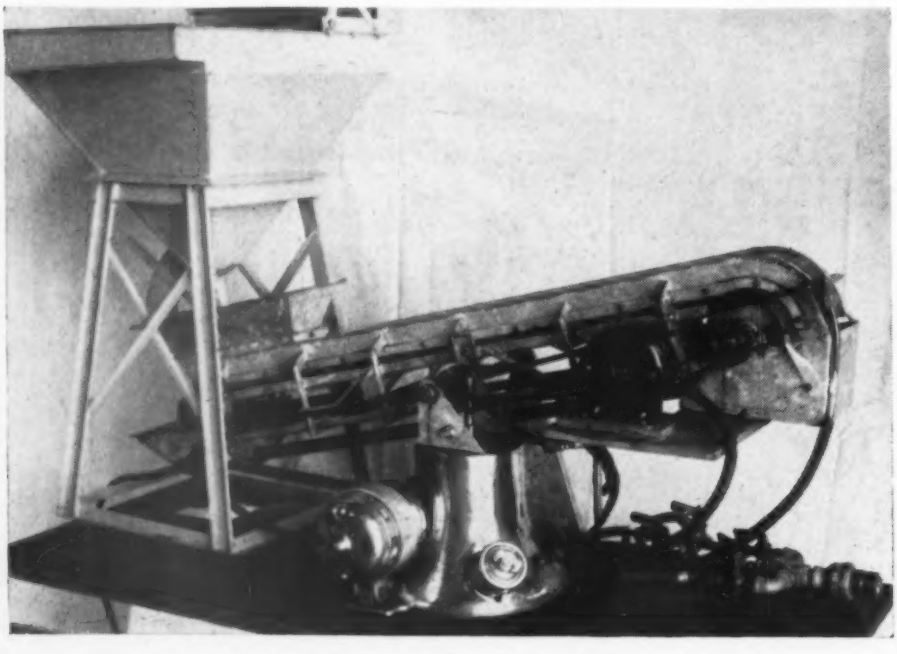
For handling sand, the unit may be fed direct from classifiers or from excavating equipment and can be used for transfer to inclined belt conveyors, for loading cars, etc. As a rinsing unit, gravel may be fed into the conveyor hopper and spray water be applied in the hopper or over the belt and be removed before the gravel reaches the top. A spray water attachment is provided to keep the pulleys clean.

Another unit of comparatively recent development for classification is the Denver Equipment Co. "Cross-Flow Classifier" which consists basically of a helical conveyor flight (one or two) and a settling tank. The feed box has adjustable splitter buttons to give an even distribution of feed over a wide area, designed to provide a uniform surface current from feed to overflow.

In this classifier, the overflow weir is on the side opposite the feed and the upper half of the conveyor flights are in line with the direction of pulp flow across the classifier, which features were incorporated into the unit to permit an uninterrupted, smooth flow of pulp to the overflow weir at the expense of excessive eddy currents which hamper classification efficiency. The conventional end overflow weir is optional.

The conveyor rotates so that the flights move downward in front of the overflow in order that the coarse material cannot accumulate near the weir and overflow with the fines, and to aid washing without creating much agitation. Drainage from the conveyed sand is down the overflow side of the tank. Fines and water drained out of the sands enter the pool near the overflow weir and are not mixed with the unclassified feed on the settled sands.

Action of the helical conveyor is slow, to minimize turbulence but with sufficient cascading action created to separate the fine material remaining in the sands so it may return to the surface stream. Both the feed and overflow weirs are of adjustable height for flexibility in the size of the pool area, to vary the tonnage and separation according to size. These



Model of dewatering conveyor and classifier recently developed by Kern

classifiers function as dewatering units as well.

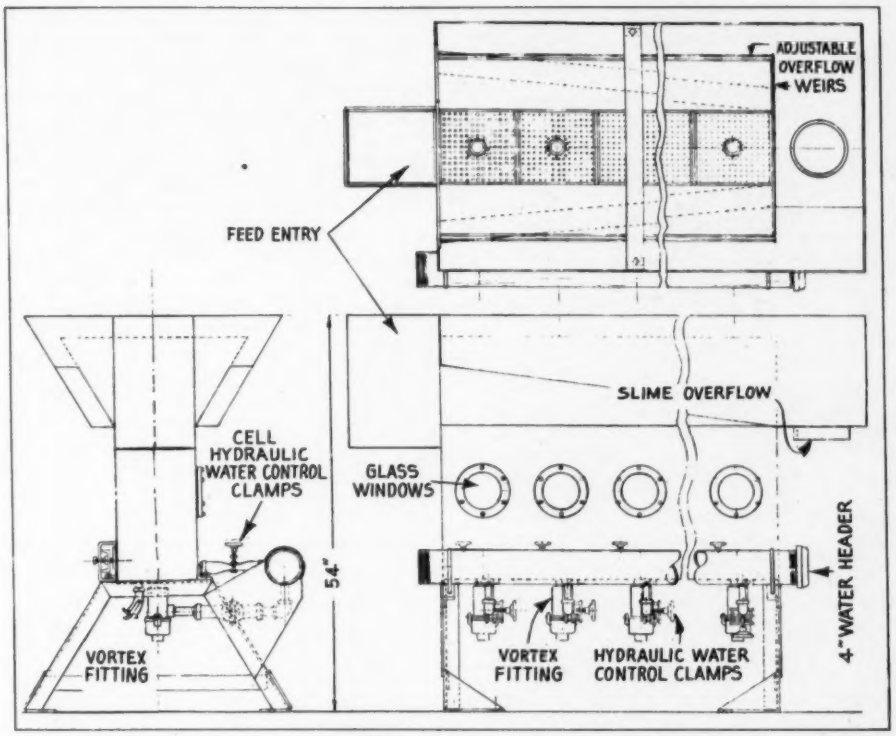
Other manufacturers have been active in developing methods of increasing and adjusting weir lengths to recover fine sand and, in a few instances, to recover definite percentages desired of the various size gradations of sand. The Webster Manufacturing Co. has a device for those purposes, to be applied to either sand drags, screws or ordinary settling tanks.

Essential features are a downspout feed into the lower part of the tank, with rising current sorting columns placed above in the tank, in a self-contained compartment. These sorting columns overflow to a series of parallel weirs, forming overflow downspouts crosswise of the compartment. These are parallel flumes connected to a common overflow waste flume on the side. There is provision for adjustable lips on the parallel overflow spouts so that the height of each weir may be raised or lowered individually. A total weir length of 52 ft. is provided by a series of 6½ pairs of overflow weirs, each 4 ft. long.

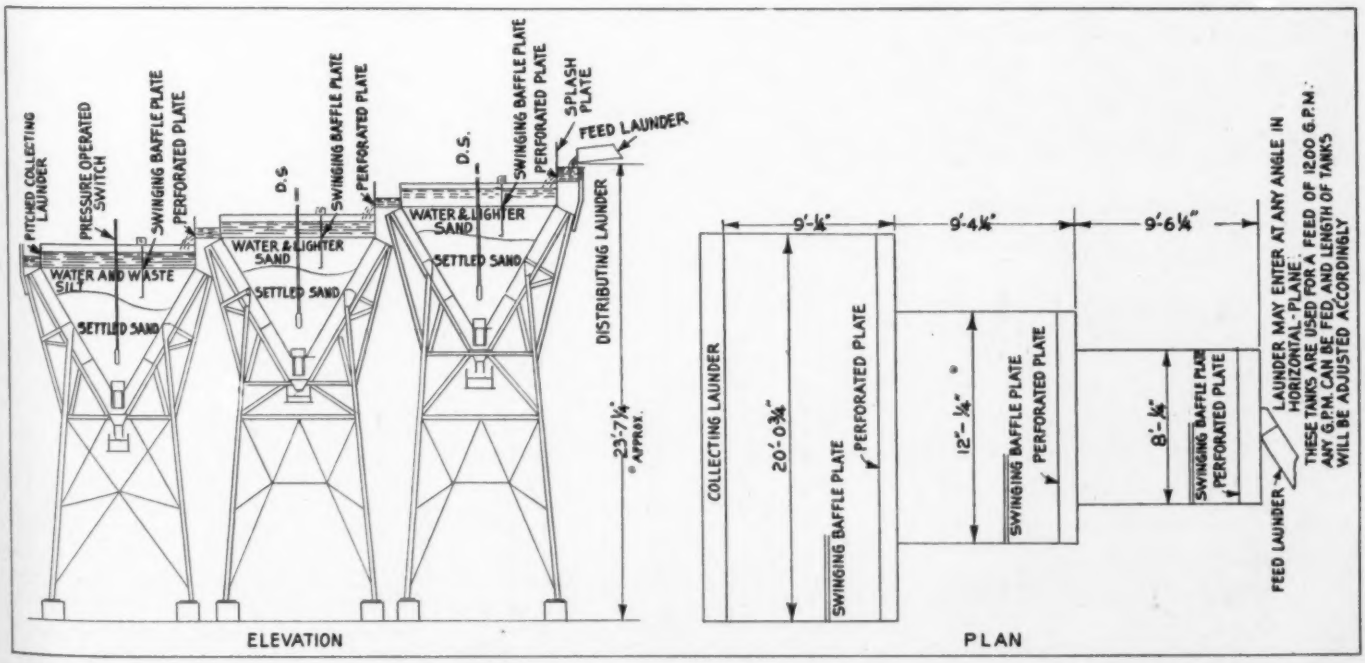
By raising or lowering the weir lip of any one or more weirs, the velocity in the effected sorting column and the weir overflow velocity may be varied, thus permitting the wasting of fines or even intermediate grain sizes in one column while saving them in another. A complete discussion of this ingenious development was published in ROCK PRODUCTS, September, 1947, pp. 90-91.

The Eagle Iron Works "Long Weir Screw Washer-Classifier-Dehydrator" is another interesting unit for handling fine materials. It is designed for the retention of fines to controlled classification or for maximum retention of fines as such. This is a screw flight machine with three adjustable weir lips. With all three weir lips in use, water flows over end and side lips to provide three times the normal weir length and lowered head of water over the overflow weir. Proportionate low water discharge velocity is effected with this arrangement, where maximum retention of fines is the objective. When classification requires adjustment, raising of one or more weir lips, with proportionate shortening of the usable weir length is the adjustable feature in combination with changes in the wash water feed rate. Tilting of the end lip and raising of one or the other side lips provide compensation for out-of-level tub condition.

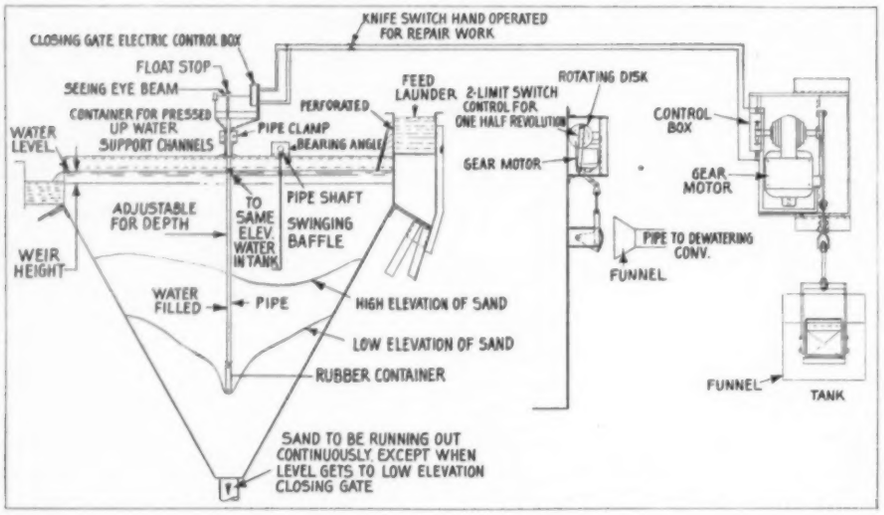
Eagle perforated flights are provided from the water line to the upper material discharge end to increase dewatering efficiency and a built-in feed box has been developed so that fine material may be fed in at the



Constriction plate classifier (Deister Concentrator) for classifying sands by rising currents of hydraulic water



Arrangement of three sand classifiers (Kern) in series to settle coarse, medium and fine sands. Note relative lengths of overflow weirs in plan drawing



New sand classifier of Fred T. Kern Co. designed to minimize turbulence and for continuous discharge

definite optimum location. The feed box extends into the water to reduce eddy currents and turbulence and two sets of screens serve as a baffle to break the velocity of fine material feed.

Screw flights are of sectional design for replacement of worn flights as wear occurs. Two flights make one complete revolution and each flight can be lifted from the shaft by simple removal of a U-bolt. Paddle flights may be substituted easily for the screw flights. Sealed-off Timken roller bearings carry the end thrust of the screw shaft at the upper end and water-lubricated Hydrotex bearings support the lower end of the screw shaft below the water level.

The foregoing machine is available with either a single or double screw, depending upon capacities required, and in 18-, 22- and 25-ft. tub lengths, depending upon the degree of dewatering desired.

A new feature of the Eagle double log washer is the use of renewable corrugated paddle shoes bolted to steel feet attached to welded fabricated angle steel logs. The shoes are of increased thickness and have a wearing surface provided with chilled corrugated sections to deliver severe scrubbing action in processing cemented aggregates, and those containing tough clays and soft particles.

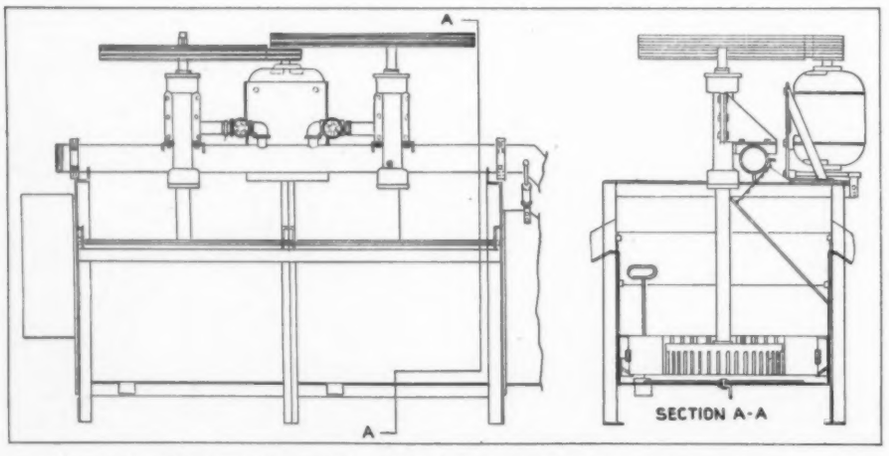
Another interesting cleaning device which we only mention here, because it is not of recent development but has possibilities of application in view of modern specifications, is the concentrating table manufactured by the Deister Concentrating Co. The table has been improved considerably in details, however, since it was first applied for the removal of foreign materials from sand and gravel back in 1933. About that time, T. L. Herbert and Sons, Nashville, Tenn., installed these tables for the removal of foreign materials from both sand and gravel and they are still operative in the improvement of Cumberland river materials.

Gravity is the principle of separation, over riffling tables. In the removal of foreign material near the specific gravity of sand and gravel, such as shale and soft stone, etc., and in the removal of materials of considerably lower specific gravity such as coal, sticks, etc., the table has been effective. According to experience, sizes up to ¾-in. involving separations of materials of nearly identical specific gravities, and up to 2-in. where considerable difference in specific gravity exists may be handled. Operations of the tables at the Nashville plant, on sand, were described in the August 25, 1933, issue of ROCK PRODUCTS.

Another product of this company, of possible interest for sand classification, is the Concenco Construction Plate Classifier which consists of a number of cells and operates on the principle of rising currents of water to effect classification. Each cell is square in horizontal cross section and consists of a pressure chamber at the bottom, a sorting column or chamber immediately above and separated from the pressure chamber by a constriction plate (a plate with holes bored in it), and a launder section above.

The large number of holes in the constriction plate is for attainment of a uniform velocity of water in the sorting column and the amount of water entering each cell is regulated by an adjustable clamp on the hose sections of the water inlet pipes. The launder section flares out above the sorting chambers so that water currents rising from each sorting chamber decrease in velocity in accordance with cross-sectional area. Adjustable overflow weirs are provided on the launder section to control the distribution of slime overflow water. Cells operate in series, coarsest particles settling in the sorting chamber of the first cell, the remaining sand becoming the feed for the second cell where the coarsest remaining particles settle, etc.

The foregoing are but a few of the developments for classification. The Dorr Co. has an improved hydraulic classifier, the Hydrosizer, with automatic controls, and has effected very interesting results in the fractionating of sand for recombination to closely controlled size gradation in recent years. Other manufacturers have been active in the development of equipment for classification and a number of new machines are soon to be announced.



Improved flotation machine (Galigher) designed for increased aeration

Separation of Dry Materials

In the separation of dry materials there are interesting possibilities. The Sulton, Steele and Steele air table is adaptable to control separation of certain materials by apparent bulk density or weight per cu. ft. Soft, porous particles may be removed from hard particles by air tabling. The manufacturer claims that, in lime plant operation, a separation may be made of burned particles from unburned particles and that in gypsum operations, anhydrous particles may be removed.

This table will handle properly sized

particles as coarse as ⅝-in. and, it is claimed, will separate particles which have been properly screened, down into the 50-mesh size range.

A second unit, the Controlaire, has been developed for separation of particles sized in the range of 10- to 200-mesh and is said to be an effective deduster. Its efficiency is best when not over 40 per cent of the materials are to be lifted as lighter. The company also manufactures a new electrostatic separator called the Electro-Float.

Ritter Products Corp. has a relatively new classifier which accomplishes dry sizing without use of screen cloth by employing a centrifugal and static force in combination, suitable for materials which accumulate a surface static charge and agglomerate, thereby plugging screen cloth. It is suitable for sizing below 50-mesh.

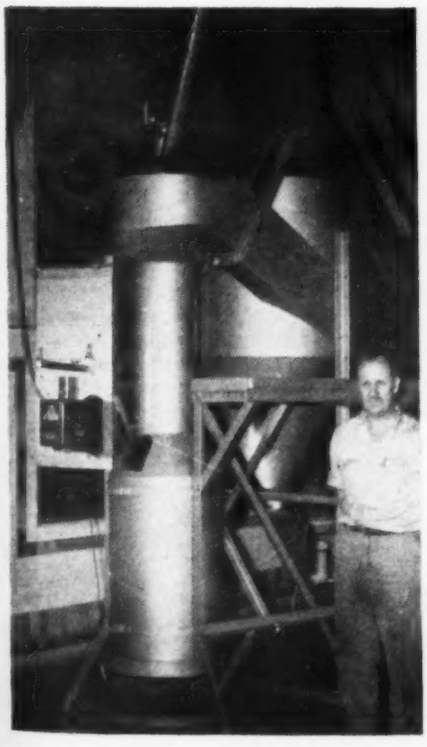
Flotation

In the field of flotation, various improvements have been incorporated into machinery. The Galigher Co., for example, has some new ideas in its Agitair flotation machine which are the outgrowth of suggestions obtained from operators of flotation plants.

One is the adoption of open tank and frame construction which exposes more froth area to the visibility of the operator and to permit greater ease in making repairs while requiring less headroom. Welded steel construction has almost entirely displaced castings in order to eliminate unnecessary weight. New flat type large diameter impellers have been adopted to increase circulation and aeration. Hollow shafts for air entry into the pulp have eliminated individual cell air piping.

The Mine and Smelter Supply Co., in its improved Massco-Fahrenwald flotation machine, employs a feature called the outward flow principle. Objectives of the new design are increased aeration, increased air per unit of power, better diffusion and more uniform distribution of air, and the ability to increase aeration with feed overloads.

The "Mobil Mill," a semi-portable sink-float plant developed by Western-Knapp Engineering Co., has a separating capacity of 15 to 25 t.p.h. and may have possibilities in the separation of water-logged chips, coal, clay balls, shale, etc., from gravel. The process employs a ferro-silicon (or magnetite or galena) medium and is claimed to have operating costs sufficiently low for treating low priced commodities such as aggregates (See ROCK PRODUCTS, May, 1947, p. 72).



Controlaire (Sutton, Steele and Steele) for separation of dry materials down to 200-mesh size

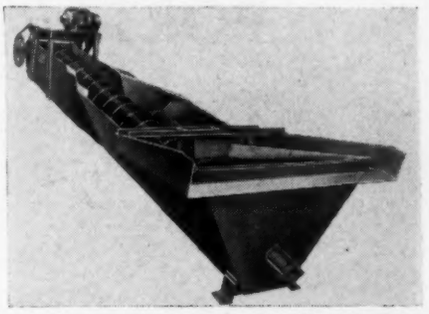
PORTABLE PLANTS

MANUFACTURERS of portable crushing and screening plants for the production of crushed stone and sand and gravel have been very active in plant development and design the last several years. The portable plant, as a result, has become a versatile operating unit and its early limitations have been supplanted by far greater flexibility in the production of commercial aggregates sizes.

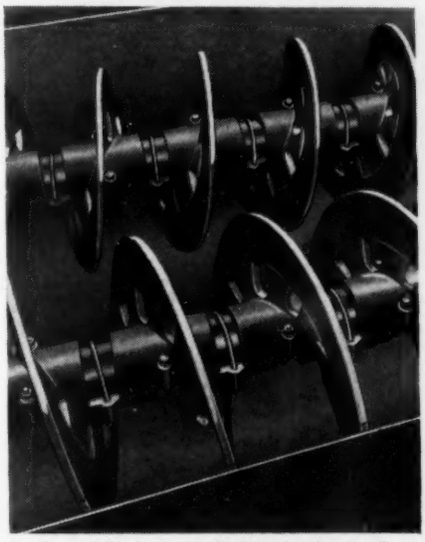
Portable plants have the ability to perform many of the functions formerly considered reserved for stationary plants. Modern, portable plants are compact units, capable of remarkable tonnage per hour and per unit of manpower. They produce several sizes of aggregates simultaneously and may be equipped with such auxiliary equipment as log washers and other special devices when extraordinary conditions require.

As the enormous postwar highway building program progresses, much of the tonnage of aggregates will be produced by portables, which have the flexibility for adaptation to outlying locations remote from metropolitan centers, where high freight rates are the limiting factor for localized permanently-situated plants.

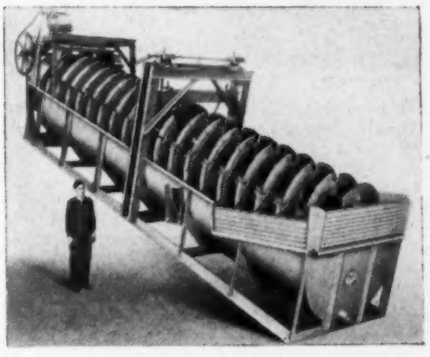
Much of the mileage of roads will be through territory where there are no permanent plants and it is logical that producers who are experienced in the production of aggregates to meet rigid specifications be entrusted with the production for those sections of roads and highways. The portable plant under such circumstances would, of course, be the means for extension of markets, by stationary plant operators as they have been for years in the North Central states, or for protection of already large investments



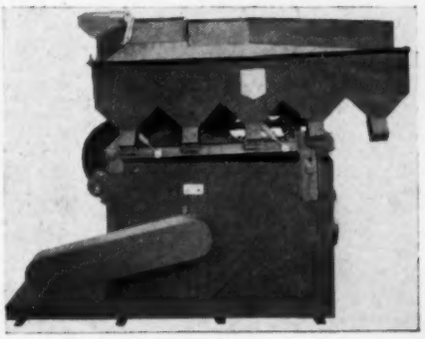
Eagle single screw long weir washer-classifier dehydrator for fine material



Section of Eagle screw flights showing perforations to drain off trapped water



Denver cross-flow classifier, with overflow weir on side opposite feed. Feed and overflow weirs have adjustable heights for size regulation



Air table (Sutton, Steele and Steele) for separation of materials by bulk density

PORTABLE PLANTS

Portable plant, consisting of a primary unit with long conveyor and a secondary unit producing 130 t.p.h. of ¾-in. material for E. W. Coons Co., Hibbing, Minn. (Pioneer plant)

Semi-portable plant by Pioneer to produce two sizes of coarse aggregates and sand for small operations

in permanently-located plants.

In the Pacific Northwest it is becoming practice for highway departments (Oregon) to select the deposits from which aggregates are to be processed and to invite bids on that basis which, naturally, limits the scope of activities of permanently-located plants. On extremely large projects, where demands dictate that large but temporary stationary plants be built, portable plants can sometimes serve a useful supplemental function for re-crushing purposes. The Morrison-Knudsen crushed stone plant built to produce aggregates for the Fairfield-Suisun airport in California several years ago, had a set-up whereby the main plant produced enormous tonnages of the main sizes specified, which production was permitted to continue without interruption while smaller special sizes were produced independently. In this operation, which we cite purely as an example (See ROCK PRODUCTS, December, 1945, pp. 96-99), 3-in. stone was withdrawn from large ground stockpiles and processed through a standard portable plant to 1-in. stone.

Most portable plants have one or two crushers, usually jaw crushers for primary reduction and roll crushers for further reduction, vibrating or revolving screens and employ belt conveyors for stockpiling or loading. Some complete plants comprise independent portable primary units and secondary and even tertiary units, designed for related operations. A few are self-propelled and they may be equipped for gasoline, Diesel or electric power. Compactness and lightness in weight are factors that have been emphasized in postwar designs.

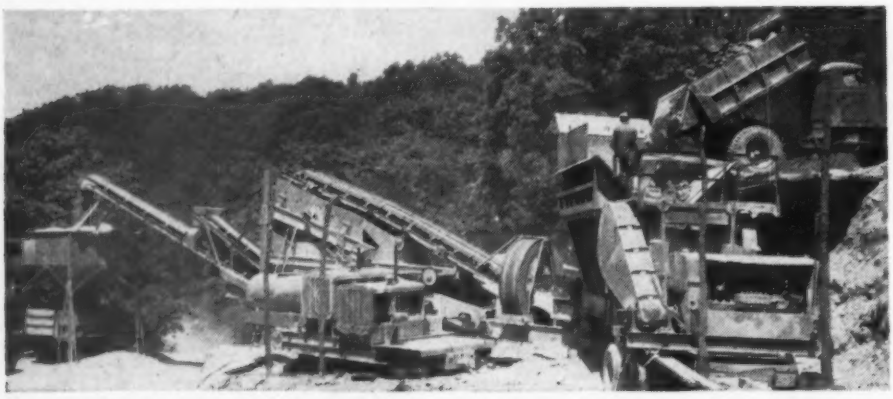
Some of the more recent developments follow.

Universal Engineering Corp. has a number of production plants for sand and gravel and for crushed stone. One development is the 546-P portable primary crusher, for handling large stone, which can be followed by one of the "880 Gravelmaster" plants which will receive the output of the primary crusher, screen out the finished material and carry the oversize to two additional crushers for further reduction. The output of these crushers goes to the screen for finish grading.

The 546-P unit consists of an overhead eccentric-type, roller bearing jaw crusher with reversible manganese steel jaws, hopper with apron feeder, bar grizzly and by-pass, under conveyor and power all mounted on a single truck. The crusher has double crushing action which imparts a "primary" blow at the top of the jaws and a "secondary" stroke at the bottom. The under conveyor carries the by-passed material and crushed rock to the feed hopper of the secondary plant. Sizes of the crusher unit are 18- x 24-, 20- x 36-, 24- x 36- or 30- x 42-in. with capacities ranging as high as 495 t.p.h. exclusive of the fines passing the grizzly.

Gravelmasters are mounted on pneumatic tired chassis, are available in four sizes, and are designed for use as secondary plants or as complete gravel crushing, screening and loading plants, and in connection with auxiliary equipment, for production of washed gravel in two, three or four sizes. They comprise an overhead eccentric force feed jaw crusher, manganese shell roll crusher, 2½-deck gyrating screen, channel frame under conveyor, feed conveyor, delivery conveyor, "Rotovator" for elevating material between conveyors, charging hopper with mechanical feeder, mixing hopper and sand reject hopper. The one-half deck screen rejects sand or dust for direct track loading; the swing gate permits regulated amounts of fines to be mixed with the finished product.

From the charging hopper the pit material is fed on to the feed conveyor which conveys it to the 2½-deck screen. Material rejected over the top scalping deck is chuted to the primary jaw crusher, that retained on the second deck flows to the roll crusher and material passing the second but retained on the half-deck flows to the mixing hopper. The under conveyor and the Rotovator are the means for transfer of material from both crushers back to the feed conveyor for re-



Portable plant consisting of a portable primary crusher unit and a portable crushing and screening unit with roll crusher, screen and conveyors (Universal)

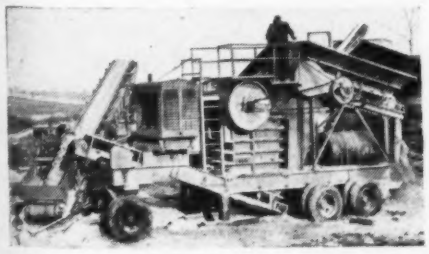
screening. Capacities, based on 1-in. material with 25 per cent oversize, range up to 200 cu. yd. per hr.

The Universal "Pacemaker" has been developed for crushed stone production, providing for three stages of reduction in a single unit. This plant may be broken into two units, the 546-P unit and the other a portable and screening unit consisting of the Twin-Dual roll crusher screen and necessary conveyors on a separate chassis. The 546-P unit in combination with a conventional double roll crusher with screen and conveyors on a separate chassis comprises a lower production unit. Feed is direct from the quarry with power shovel. The Twin-Dual unit consists of two sets of different diameter rolls on each roll shaft.

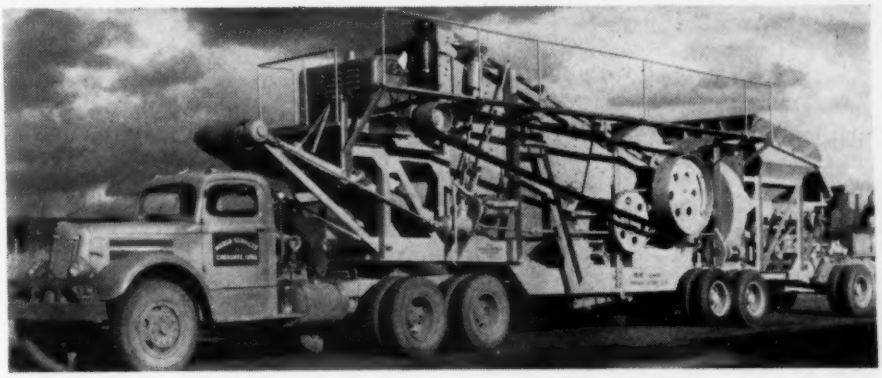
The Twin-Dual Master gravel plant, latest development of Universal, is a 3-stage gravel plant with Twin-Dual roll crusher which with the primary jaw provides three stages of crushing. The rolls are of different diameters on common shafts and operate simultaneously. This plant was described on page 71, ROCK PRODUCTS, July, 1947.

LIPPMAN ENGINEERING WORKS, just prior to the war, developed a self-propelled screening, crushing and loading plant which was designed for one-man operation. Material is fed through a grizzly hopper at the front end of the machine and a reciprocating feeder regulates the flow to a feed conveyor which conveys to the screen at the top of the plant. Oversize is diverted into a jaw crusher and the intermediate size into a roll crusher. Sized material through the screen drops on to a loading conveyor for transfer to a loading hopper for trucks at the back of the plant. Crusher throughs are recirculated over the screen by the feed conveyor.

In the newest model of portable plant by Diamond Iron Works, Inc., portability has been enhanced by a design to permit movement by dual axle tractor. Equipment includes a 10- x 36-in. jaw crusher, 30- x 18-in. roll crusher and a 2½-deck 4- x 10-ft. screen activated by positive eccentric. Bearings are anti-friction and production follows a straight-line flow. The Diamond Rotor-lift accomplishes the recirculation of crushed oversize. To conserve space, the main conveyor operates through the Rotor-lift.



Self-propelled portable plant (Lippmann)



Newest model Diamond portable plant leaving factory for service in Iowa

During the war, Pioneer Engineering Works, Inc., designed and manufactured very large portable crushing, screening and washing plants and, since the war, developed the Continuflo two unit plant with larger production, greater maneuverability and reduced weight per unit. The plant consists of matched standard portable primary and portable secondary units.

The primary unit of this plant, for gravel or stone production, is available with a 1536, 2036 or 2436 jaw crusher. The feed has been standardized into three types, the apron feeder mounted on the unit, the portable apron feeder on pneumatic tires and the traveling grizzly feeder mounted on the primary. The secondary unit has a 40- x 22-in. roll crusher, a 4- x 10-ft. three and one-half deck screen with a split feed. The heavier secondary has a 54- x 24-in. roll crusher with a 3½-deck 4- x 12-ft. split-feed screen.

The gravel plants differ from the stone plants only in the primary crusher, feed to the gravel primary being by belt conveyor and mechanical feeder mounted on the plant or by a long swivel-type conveyor with a mechanical feeder resting on the ground. Pit run material is fed to a 1½-deck, 4- x 6-ft. vibrating screen, oversize going to the jaw crusher which is available in 1036 and 1536 sizes.

One of the newer Pioneer plants is the Diesel-electric 46 VE Duplex crushing and screening plant, which is primarily a gravel plant but one designed for use as a crushed stone plant when provided with a primary crusher ahead of it.

Principal equipment consists of an overhead eccentric type jaw crusher, size 1036, a 40- x 22-in. roll crusher, a 3½-deck 4- x 12-ft. vibrating screen, mixing hopper and sand hopper, 30-in. x 50-ft. feeder conveyor, delivery conveyor, return conveyor system and storage bin. The screen is designed for bottom-deck feed with a sand screen. Pit run material is fed to the bottom deck from which sized material is passed to the mixing hopper for discharge to the delivery conveyor. Oversize goes to the jaw crusher and the product is returned to the top screen deck where a size is passed directly to the hopper, by-passing the bottom deck. Oversize from the top deck goes to the roll crusher and is returned then to the top deck.

Just announced by Pioneer is a semi-portable crushing and screening plant for the requirements of small operations in the production of two sizes of coarse aggregates and sand. Designated the No. 55, it is a hopper-fed plant consisting of a jaw crusher, bucket elevator and transfer conveyor —all mounted on a 4-wheel trailer. A revolving screen is a complete unit mountable on a bin.

Capacity is 10-15 t.p.h. with a setting of 1½-in., using a 1016 jaw crusher, or 15-25 t.p.h. with the size 1024 jaw crusher. Power is delivered by a 50-hp. gasoline or Diesel power unit.

IOWA MANUFACTURING CO. has developed a comprehensive line of portable aggregates plants. Probably the newest is the Cedar Rapids Tandem Straight-line plant, a complete portable gravel plant on tires, announced in 1946. By use of a primary breaker ahead of this plant, it is converted into a quarry plant and, with the addition of a compartment bin unit with screen, is transformed into a multi-size crushing plant. Addition of sprays, washing screens and a sand tank makes the plant a complete crushing, screening and washing plant. Standard equipment includes a 10- x 24-in. jaw crusher, a 16- x 24-in. roll crusher, a 2- or 2½-deck 3- x 10-ft. horizontal vibrating screen, conveyors, a feeder, return wheel, power unit, V-belts and universal drives.

NEW HOLLAND MANUFACTURING CO. has added a complete line of portable crushing, screening and loading plants since the war. Newest in the line is a 2-unit, one-man operated, push-button controlled plant for gravel or stone crushing. A 3030 double impellor breaker is driven by Diesel power and an auxiliary generator furnishes electric power for individual drives for the feeder, conveyors, screen and elevating wheel. In conjunction with the plant are portable conveyors for loading bins or stockpiling. The crushing unit is an impact breaker, serving as both primary and secondary crushers, and the rated capacity is 200 t.p.h.

DUST COLLECTION

DUST COLLECTION in any industry is each day becoming a must. State and local laws are gradually creeping into all branches of industry so that eventually our cities and industrial sections will not only be more liveable, but the removal of dust in any plant results in a more efficient operation. The members in the rock industries are cognizant of these facts, and among the leaders are many companies in the portland cement industries, such as the Universal Atlas Cement Co., Lehigh Portland Cement Co., Lone Star Cement Co. and others who are, or have just recently installed electrical precipitators for removal of dust from kiln gases.

For a complete discussion of the latest practice in cement plant dust collection we refer the reader to the August, 1947, issue of ROCK PRODUCTS containing the description of the Universal Atlas Cement Co.'s precipitators at Leeds, Ala.

The newer plants in all phases of the rock industry where dust is encountered are being provided with suitable dust collectors to make the plants practically dustless. The new gypsum and wallboard plant of the National Gypsum Co. at Baltimore, Md., is being so designed that all phases of the operation will be dustless, and many different types of collectors will be used with each type selected to fill the needs of that particular operation.

Besides the cement industry, dust collection in bituminous or "black top" plants is becoming very common practice. Such dust collectors, as above referred to, are to fill the more apparent needs, but many manufacturers are marketing smaller units of portable and semi-portable types so that valuable materials can be recovered, or operators protected from silicosis and other dust hazards.

It is noteworthy that all the newer pack houses in the portland cement, lime, and gypsum industries have gone over 100 per cent for complete dust collection. Such developments make for better labor conditions.

The amount of and nature of the dust recovered, in many instances, is small and the commercial value of the dust likewise small; however, in many instances the value of such dust is an important item.

Dust collection as a whole has broadened and no matter how tough the collection problem may be, a review of the literature here will possibly offer a solution.

The Western Precipitation Corporation, Los Angeles, Calif., has several new installations of large capacity electrical precipitators in the cement and other rock products industries. The newer Cottrell installations, especially in the cement industry, feature the use of pocket electrodes. These had been previously used in metallurgical work and with good success, and the manufacturers are offering pocket electrodes for use in the last section of all precipitators intended for the cement plants. Besides the installations at Leeds and Northampton, Penn., Cottrell precipitators were installed at the Oswego plant of Oregon Portland Cement Co., and on the calcining kettles at the new gypsum calcining plant in the east.

Minor developments in rappers, damper control, automatic controls, etc., have all followed along with the general development of Cottrell equipment.

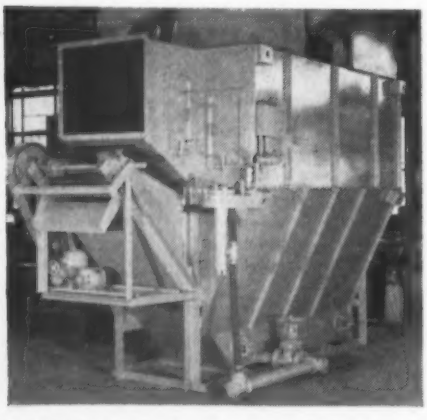
This same organization has introduced a combination cyclone and electrical precipitator so that coarser dust can first be recovered in the cyclones and the gases cleaned in the Cottrell's. In some cases, as in cement work, the two recovered dusts can be given separate treatments, either returned to the kiln feed (all or in part) or rejected.

The Multi-Cone collectors of Western Precipitation Co. are being used on coolers. The Siegfried, Penn., plant of the Lawrence Portland Cement Co. uses this type of collector on its kilns.

So called "black top" plants which are becoming an important part of our industry, in many states, are faced with the necessity of controlling dust. As an illustration, the Lehman-Roberts plant, Lexington, Ky., corrected its situation with a Type W. Roto-Clone and Skimmer precleaner.

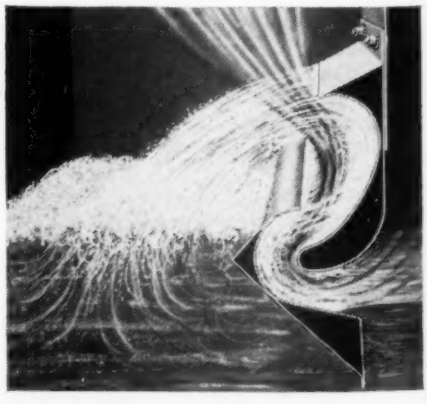
The newer Type N Roto-Clone, made by the American Air Filter Co., Inc., of Louisville, Ky., has been designed to permit a wide range of capacities for any size Roto-Clone. Air volumes ranging from 500 c.f.m. to 1100 c.f.m. per ft. of impeller length can be handled without changes. The Type N is a hydrostatic collector which cleans the air by means of a water curtain induced by the flow of air through the collector unit. It requires no pumps or auxiliary equipment. The movement of the air through the collector is by means of an exhauster on the clean air side of the unit. The movement of the air through the sinuous passages of the stationary, S-shaped, curved impellers imparts a centrifugal force to the liquid and projects it across the passage of the upper blade. At this point the air is forcibly drawn through the sheet of resulting liquid resulting in the cleaning action. Provisions are made for reversal of the flow of liquid and a re-scrubbing of the gasses. The dust is precipitated into the liquid and drawn from the collector by continuous flight conveyors.

The Oswego plant of the Oregon Portland Cement Co. in its new and



Redesigned, Type N, Roto-Clone dust collector of the American Air Filter Co.

The use of this device on dry air-operated air drills is a development of the Kadco Corporation



The inverted "S" stationary impellers account for the thorough wetting of the dust particles and used on Type N, Roto-Clones

large additions is using an American tubular collector to remove dust from the primary screening operation following the 38-9 Pennsylvania impact crusher.

One of the more recent developments is the Northern Blower Co.'s Norblo cement air cooling system which enables the bag type dust collecting systems to function as an air cooler, preventing the cement from reaching excessive temperatures while being ground. This also has an axial flow centrifugal dust collector which eliminates most of the piping ordinarily required. The collector can be placed in any straight line of piping without much alteration, and as all air has a parallel flow there are no turns or elbows and no change in direction of air flow. Simplicity, high efficiency and the convenience of strategic locations with respect to the stacks are claimed for this unit.

The company is also marketing a complete line of portable, bag-type dust collector units ranging from 300 c.f.m. on up, and have up to 8-in. static pressure on the fan They are intended for light loads, but employ the same principle as the larger Norblo bag-type collectors where dust laden air enters the bottom and flows upwards inside the bags. For wet or moist grinding or polishing, a line of Norblo impregment and filter type units are available.

Not all dust collector installations have been of the electrical precipitator type for The Dewey Portland Cement Co., Davenport, Iowa, installed Buell Engineering Co. New York cyclonic collectors. Similar collectors are being installed at the Victorville plant of the Southwestern Portland Cement Co.

In the bag type of collector the area of the filtration cloth is an important factor in capacity considerations. The W. W. Sly Manufacturing Co. was the original patentee of the cloth type filter and claims that its collectors have more cloth and hence greater filtering capacity.

THE KOPPERS CO., Baltimore, Md., has secured the American rights to an electrical dust precipitator that is based on Swiss patents. It has been installed in several plants in the United States other than in the rock industries, but an installation is now being completed at an eastern portland cement plant. The precipitator will be installed between kilns and the stack and is said to be the first installation of its kind in a United States cement plant. The performance of this precipitator will be watched with considerable interest by the cement industry.

DRACCO CORPORATION, Cleveland, Ohio, has made rapid strides in general dust collection work using the Dracco Multi-Bag Filter collecting system. This type of filter is said to give low operating and maintenance costs with all working parts easily accessible. In case replacement of a

(Continued on page 158)

Safety Congress Meeting

Cement and Quarry Section, National Safety Congress, reviews injury experience. Inexperienced employes need training

SAFETY LEADERS of the cement and quarry industries gathered in Chicago at the National Safety Congress in October to pool information and to exchange ideas about accident prevention work. More than 10,000 industrial, traffic and public safety specialists, officials and executives from the United States and Canada attended the week-long convention, one of the features of which was a tremendous safety and health exposition by manufacturers, suppliers and service agencies.

Two afternoon meetings of the Cement and Quarry Section of the National Safety Council were highlighted by a review of the injury experience in the cement and quarry industries of the nation by the U. S. Bureau of Mines and an inspiring talk by the superintendent of a Canadian cement plant.

The accident data were prepared by FORREST T. MOYER, chief of the Accident Analysis Division of the Bureau of Mines and given in his absence by DANIEL HARRINGTON, chief of the Health and Safety Branch of that Bureau. They disclosed that the rate of occurrence of fatal injuries in 1946 was reduced, but this improvement was offset by a slightly less favorable frequency of non-fatal injuries.

Cement Rate Lowest

The combined rate of fatal and nonfatal injuries advanced to 33.43 per million man-hours from 32.82 in 1945, according to the Bureau's report. The injury frequency rate for all mills and quarries in the cement industry was 13.47, an advance of nearly 1 point. "The imperative need for job training was recognized in this industry during the year and efforts were made to reduce the high proportion of injuries to inexperienced employes," said Mr. Harrington. Many of the paper's references to detailed analysis of the 1946 accident experience were to Portland Cement Association Accident Prevention Bureau figures and publications which are recognized as the most thoroughgoing in the field.

"Accident prevention in limestone quarrying and mining (excluding lime plants and associated quarries) suffered a severe setback, and the injury rate rose approximately 7 points over 1945 to 47.17 in 1946," the report stated. "This rate was higher than the average for the past five years and was nearly at the 1942 rate. The injury record in slate quarrying also receded in 1946 and the rate gained nearly 5 points to 54.82 injuries per million man-hours of work.

"The remaining quarry industries —lime, marble, sandstone, granite and traprock—showed varying degrees of improvement in their 1946 safety records," according to the report. "At lime plants, including the associated quarry work, the improvement was slight and the 1946 rate of 48.98 injuries per million man-hours was only half a point better than in 1945. Injury experience at traprock operations was lowered 1 point to 46.15. At granite quarries the betterment in accident prevention was 4 points to a rate of 42.86 injuries per million man-hours of work in 1946. The marble and sandstone industries had the greatest improvement in safety of any of the quarry industries and the 1946 rates of 30.30 in marble and 47.40 in sandstone operations were respectively 13 and 10 points better than in 1945."

Safety for Newcomers

The new employe's first 30 minutes on the job and the importance of this induction period to his later safety was the theme of the inspiring talk by D. A. GASPER, superintendent of the Hull, Quebec plant of Canada Cement Company, Ltd.

"We are told that the real problem in the years to come is the one of making the most efficient use of our natural resources," said Mr. Gasper. "Are we aware that not the least of these resources are to be found in the undeveloped minds of our workers who are daily entering our industrial gates? 'It's not what we have but what we use; it's not what we see but what we choose'—these are the things that mar or bless the sum of human happiness. We search the top strata for executive timber; we allow the lower channels of this human product to go unexplored, undeveloped and unknown."

Mr. Gasper continued: "Industry has many proud achievements. Above all it supplies a better environment and a better way of life for the human family. Let us in our education program transmit this knowledge as well as the knowledge of the job to our employes. Esprit de corps comes from achievement. The proper spirit within our organization can be obtained only by the proper kind of knowledge and training. Knowledge plus wisdom is of no avail until put into action, then it becomes a power which will help wash away many of our industrial sins.

"And how are we going to put this knowledge and wisdom to work? At

our Hull plant a system developed and grew over a period of 15 years to suit our own industrial household. As labor relations improved and results blossomed into eleven no-accident years, and won for us admission to the Thousand-Day Club of the Portland Cement Association on three occasions, our personnel felt that they had something to cherish and to foster, at least in their own plant. Our first step is to keep our standards high. This is always a challenge to the better class of workers. To qualify gives them pleasure. To pass physical and mental examinations raises their morale. Good workers like leadership. We try to give it to them from the first hour."

Mr. Gasper then explained that the first blow is struck against industrial accidents in his plant, and the foundation is laid for good employer-employe relations, in a frank, informal talk he has with newly employed workers in his office. The men are informed about the methods and policies of their new employer, what employe benefits are provided, and the cost of accidents and their effects on the worker and his family.

"Let each employe from the plant manager to the humblest worker be impressed with the fact that approximately one-third of his life is spent on the job," Mr. Gasper said. "It's his industrial household. Let it be a happy home—safe, sanitary and clean. It should be a reflection of each worker. It should reflect leadership and quality. Safety is today calling for that leadership in every branch of human endeavor."

On each of the next five days following his induction at Hull plant by the superintendent, the newcomer receives instruction from the assistant superintendent, the safety inspector, the millwright foreman, the master mechanic and the electrical foreman. "Workers come to us as strangers with distorted ideas of industry and big business," Mr. Gasper said. They expect to be treated with indifference, like cogs in the machinery, but they find their leaders displaying an active interest in them and their morale is on the way up. They must assume responsibilities from the first half-hour on the job—the care of themselves, their fellow workers and the equipment and machinery which they operate. They must take their turn on safety committees and attend, when called upon, the safety meetings. They must be prepared to return for examination on the knowledge of their job to the superintendent's office when requested.

Round Table

Other speakers at the Cement and Quarry sessions were J. E. Farr, district supervisor, The Employers Liability Assurance Corporation, Ltd., Chicago, Clyde R. Powell, personnel manager, Endicott-Johnson Corporation, Endicott, N. Y., and Anderson Hayden, safety engineer, Marquette Cement Manufacturing Company's plant at Cape Girardeau, Mo.

An open forum on common safety problems was conducted by P. N. Bushnell, assistant director of industrial relations, Universal Atlas Cement Company, New York City.

Officers of the Cement and Quarry section reelected were as follows: General Chairman, F. G. Buffington, New York Trap Rock Corporation, Cold Spring, N. Y.; vice-chairman, J. R. Boyd, National Crushed Stone Association, Inc., Washington, D. C.; secretary, Mrs. Roma M. Turpen, National Lime Association, Washington, D. C.

News Letter Editor is Dan J. Morse, Ideal Cement Co., Denver, Colo. Chairmen of committees are: Engineering, L. D. Cowling, Louisville Cement Co., Speed, Ind.; Membership, Henry Turner, A. P. Green Firebrick Co., Mexico, Mo.; Program, Lea P. Warner, Jr., Warner Co., Philadelphia, Penn.; Statistics, Forrest T. Moyer, Accident Analysis Division, U. S. Bureau of Mines, Washington, D. C.; and Visual Aids, F. L. Maus, Alpha Portland Cement Co., Easton, Penn.

Members-at-Large for 1947-1948 are: V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; F. R. Dittoe, Kelley Island Lime and Transport Co., Cleveland, Ohio; A. J. R. Curtis, Portland Cement Association, Chicago; Joh. Norvig, Pennsylvania-Dixie Cement Corporation, Nazareth, Penn.; M. C. M. Pollard, National Gypsum Co., Buffalo, N. Y.; W. M. Powell, Medusa Portland Cement Co., Cleveland, Ohio; Gen. H. A. Reninger, (retired) Lehigh Portland Cement Co., Allentown, Penn.; Walter J. Scahill, Missouri Portland Cement Co., St. Louis, Mo.; Wallace E. Wing, Marblehead Lime Co., Chicago; and T. W. Jones, New Haven Trap Rock Co., New Haven, Conn.; Staff Representative: G. G. Grieve, National Safety Council.

Venezuela Cement Shortage

CEMENT SHORTAGES in Venezuela are expected to end by 1948-49 with the development of a number of new plant facilities, according to an article in *Mineral Trade Notes*, May, 1947. Fabrica Nacional de Cementos, C. A., is constructing a small subsidiary cement plant at San Cristobal in the State of Tachira which, when completed, possibly in 1947, will produce 1200 sacks per day.

C. A. Venezolana de Cementos expects to start production at the end of this year at its three new subsidiary plants: Maracaibo, which will have a reported initial production of 7500 sacks per day; Barquisimeto, which will produce 1200 sacks per day; and Portigalete, which will manufacture 100,000 tons per year.

Construction plans also have been announced for a new plant at Chichirivichi to be financed by American and Venezuelan capital and to be known as Cementos Falcon, C. A. It will have an estimated output of 14,000 sacks per day. It also was reported that shares of the C. A. Cemento Carabobo in Valencia have been purchased by an American syndicate.

British Cement Output Up

ASSOCIATED PORTLAND CEMENT Manufacturers, Ltd., largest single cement producer in the United Kingdom, recently held a meeting in London at which time it was stated that in 1946 the company increased its cement production by 80 per cent as compared with 1945. It showed a trading profit of 580,734 pounds and distributed a 17½ per cent dividend. In addition, the increased production made possible a reduction in the price of cement of 2s. per ton in November, 1946. With the coal situation improving, output for 1947 is expected to be at least 90 per cent of the 1946 figure.

It was also announced that immediately following the end of the first quarter in 1947, Great Britain restricted cement exports to Ceylon, and that only 48,000 tons of Ceylon's 112,000 requirements for 1947 will be met by the United Kingdom. However, it is not believed that this restriction will hamper Celyon's postwar building program as India is expected to supply the difference. The Government cement mill, expected to begin production this year, has been subjected to delays in construction and the opening date has been postponed indefinitely.

The Associated Portland Cement Manufacturers, Ltd., reported at the meeting that a new cement works has been started in Mexico which will have a capacity of 300,000 tons per annum. The British company also has started construction of a new cement works at Lichtenburg, Union of South Africa. The capacity of all overseas companies, when finished, will be 700,000 tons per annum.

Cement Production

BUREAU OF MINES reports that production of finished portland cement during July, 1947, totaled 16,342,000 bbl. or 6 per cent greater than that reported for July, 1946. Mill shipments in July, 1947, reached 20,099,000 bbl., a figure 24 per cent above that reported in July of the previous year. Stocks of finished portland cement on July 31 were 13,338,000 bbl., an increase of 21 per cent over that reported for July, 1946. The industry operated at 80 per cent of capacity in July, 1947, compared with 75 per cent a year ago. Demand for cement was higher than in July, 1946, in all but two districts.

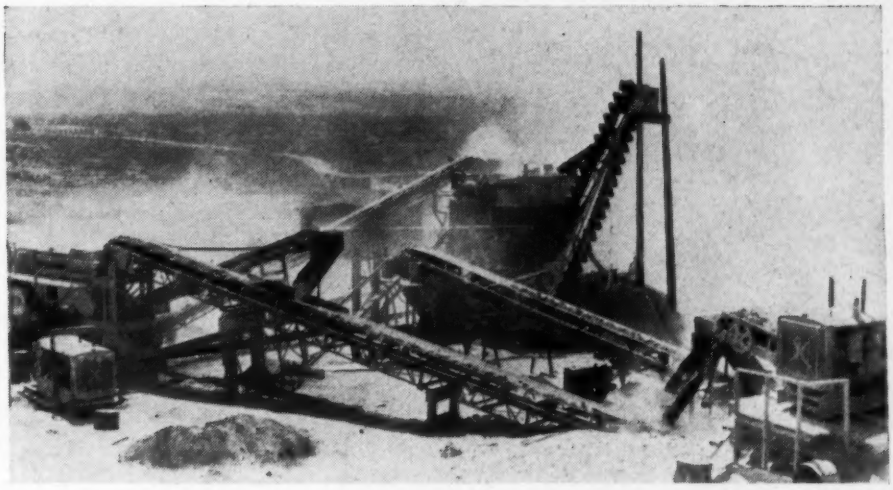
The following statement gives the relation of production to capacity, and is compared with the estimated capacity at the close of July, 1947, and July, 1946.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	July 1947	July 1946	June 1947	May 1947	Apr. 1947
The month	80.0	75.0	81.0	66.0	74.0
12 months	75.0	56.0	74.0	74.0	73.0

ONE JAW CRUSHER - TWO PORTABLE PLANTS

Diesel power unit for one of the portable crushing and screening plants

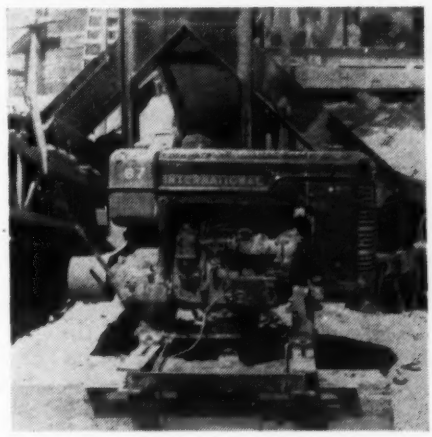


Two portable crushing and screening units operated as a single integrated plant

By W. B. LENHART

IN 1946 the Hugh McMillan Contracting Co., El Paso, Texas, opened up a limestone crushing plant on North Alabama road in the northern part of the city for processing commercial aggregates. The novel feature of the plant is that it uses two separate portable crushing and screening plants, both fed from a single 25- x 40-in. Cedarapids primary jaw crusher. A second interesting feature is the use of four Caterpillar Diesel D-13's for running the entire plant and compressor. There is one Diesel drive for each of the portable crushing plants, one driving the primary crusher, and the fourth drives a Gardner-Denver, Model WBG 724, portable air compressor. In addition there are two small International gasoline engines used; a 15-hp. unit to drive a revolving dry screen and one of 18 hp. to drive part of the belt conveyor system from the crusher. The plant being a dry screening operation, dust conditions are severe but the power units are equipped to stand up under this grueling service. Individual air filters on the "cats" are mounted at variable distance (up to 100 ft.) from each Diesel unit and connected to each power plant by 4-in. steel pipe. This insures cleaner air to the D-13's.

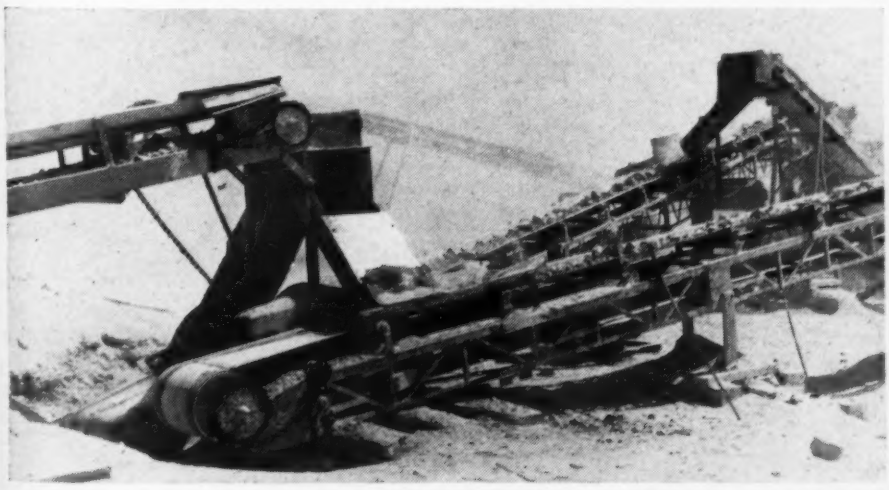
The primary crusher delivers to a short 24-in. belt conveyor, from which the material is split between the two portable plants. One portion goes to a Cedarapids portable crushing plant and the balance to a Pioneer portable plant. The former has a 3- x 12-ft. Symons vibrating screen, with the material from the top deck going to a 10- x 36-in. secondary jaw crusher and the material retained on the lower deck going to a set of 22- x 30-in. rolls. These two crushing units deliver to a return belt serving the Symons screen. The Pioneer portable plant has a Symons double-deck screen, a 14- x 20-in. secondary crusher and a set of 14- x 22-in. rolls. Final screening is by revolving screens without washing.



Gas engine drives two of the main conveyors serving each portable plant

In the quarry, which is operated in benches, three Thor 75's do the drilling. Vertical holes driven to a depth of 20 ft. are loaded with 40 per cent Apache powder and shot with electric exploders. The broken stone is loaded into trucks by a 1-cu. yd. Northwest shovel. Stone suitable for structural building purposes is sorted out and cobbed to dimensions with double-jacks.

The company recently installed a new and larger Cedarapids portable plant, using a 4033 hammer mill for the final reduction. The present plant has a capacity of 450 tons per day and fuel consumption is 45 gal. of Diesel oil for each engine per 8 hr. The company also has an Iowa Manufacturing Co. hot plant. W. E. Tucker is superintendent of the plant.



Main stream of crushed rock from primary unit is split at this point in order to supply both portable plants

Rock Dusting Materials

NATIONAL CRUSHED STONE ASSOCIATION bulletin No. 7-4 brings to the industry's attention the expected increase in use of rock dusting materials by bituminous coal and lignite mines. Information Circular 7109 of the U. S. Bureau of Mines requires:

"That the dust to be used shall not contain more than 5 per cent of combustible matter nor more than 25 per cent of quartz or free silica; all of the dust shall pass through a sieve having 20 meshes per linear inch and 60 per cent or more shall pass through a sieve having 200 meshes per linear inch; the dust shall not absorb moisture from the air to such an extent as to cake and destroy its effectiveness as a dry dust."

Kilns of the Ponce Cement Corporation, Ponce, Puerto Rico. One of the new kilns, to the left, and original kiln, to the right

CEMENT

The New Gold of the

Increasing demands for cement have stimulated the construction of new plants and expansion of older plants in Puerto Rico, Cuba, and the Dominican Republic. Island plants also are strategically located to supply Latin America

IN THE days of the Spanish Conquistadores, the isles of the Caribbean drew men with the lure of gold, spices, and other treasures. Today, men have learned that a greater treasure is to be obtained from minerals which would have been disdained as worthless by the swash-buckling adventurers of the Spanish Main.

Limestone and clay, the despised minerals of the early days, have become literally the foundation of a new prosperity based on the insatiable demands for better housing and construction for expanding industry and commerce. Cement, the end product of processing limestone and clay, is more valuable than all the gold taken from the hills, mountains, and streams of these islands since the coming of the first explorers. New cement plants have been built and older cement plants have been expanded in an attempt to catch up with the demand. It is an interesting story of industrial awakening.

Puerto Rican Plants

In 1936 the first cement plant in the Caribbean Area, excepting the Lone Star Plant at Cayo Mason, Cuba, was projected by the Puerto Rico Reconstruction Administration under Dr. Ernest H. Gruening, Administrator of Insular possessions, now Governor of Alaska.

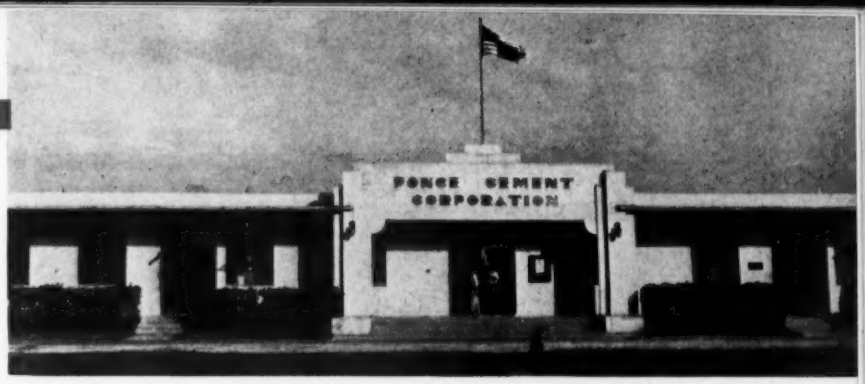
One of the most active men in bringing this project into being was my old friend, "Don" David Noble, brother of the British Consul. He was most enthusiastic about the possibilities of the island and of its need for real industrial development. He also attempted to locate paying gold, silver, and copper mines in the hills of which, unfortunately, there was hardly more than a trace. There was some alluvial gold but barely enough to equal a return for the labor involved in panning it, and at that time labor in the country received 60¢ per 12-hr. day. However, David Noble was able to impress Gov. Winship with the necessity for the plant, and with the fact that an immense amount of high lime coral deposit and the required clay were widely distributed on the island and available for making Type I and Type II and high-early-strength Type III cement to meet A.S.T.M. specifications.

MAJOR EDWIN C. ECKEL, geologist for the Tennessee Valley Authority, and his assistants, E. L. Spain, Jr., J. P. Penhalleogon, and Berlen C. Moneymaker, investigated the depos-

View of Puerto Rico Cement Corporation plant, looking toward San Juan and the Bay

of the Caribbean

By HERBERT H. LAUER*



Attractive office building of Ponce Cement Corporation

its near San Juan, Aguidilla, and Ponce. After considerable time was spent in the investigation of the geological formation and the chemical analysis of the clays, limestone, sand, and iron bearing rocks, it was decided to locate the plant at Catano, near San Juan, as the raw material was superior at that location. Consideration was also given to the fact that in all likelihood the greatest growth and consequent demand for cement would be in the San Juan metropolitan area. The greatest growth of San Juan and its suburbs have since proved the correctness of that assumption.

The original plant at Catano, under the advise of Major Chas. F. Lewis, (now works manager of Volunteer Portland Cement Co.) as consulting engineer, and under the writer's supervision of design and construction, was described in ROCK PRODUCTS in 1938.

Since 1938, a second Allis-Chalmers kiln, 8½- x 300-ft., has been installed and put in operation, and at present a third similar Allis-Chalmers kiln is being installed and should be in operation in January, 1948. The kilns are lined with General Refractories fire brick.

The antiquated method of hand loading in the quarry, insisted upon over the writer's protests in 1936, has been replaced with a modern 3-cu. yd. Bucyrus-Erie electric crawler type shovel. Gas-engine locomotives have been replaced by motor trucks which are more flexible and more efficient.

The original hammer mill has been replaced by a Dixie moveable breaker type hammer mill on account of excessive mud and clay in the stone.

At present, it is planned to replace the wagon drill used for quarry drilling with a 6-in. well drill. Two additional Allis-Chalmers mills have been installed south of the first original mills. These mills are 9- x 40-ft. tube mills. It is planned to install an additional 7- x 40-ft. Allis-Chalmers tube mill which can be used either as a raw mill or a finish mill interchangeably.

The plant is now only manufacturing Type I gray cement, and only the coral limestone and clay are used. The clay is rather colloidal and hence it requires about 40 per cent water in the slurry to pump it successfully in the Wilfley pumps. Plant output is about 2800 bbl. per day, but the new kiln will increase it to around 4200 bbl. per day.

Demand for cement is very heavy in the Island and especially in the San Juan area, which has grown from 100,000 in 1936 to over 400,000 at present.

The cement plant has been a very profitable undertaking due in part to World War II and the great demand for concrete construction for war purposes in Puerto Rico. It is my understanding that from the cement plant profits, a modern glass bottle plant, a paper box plant, and a tile and brick plant have been built and a shoe factory is planned.

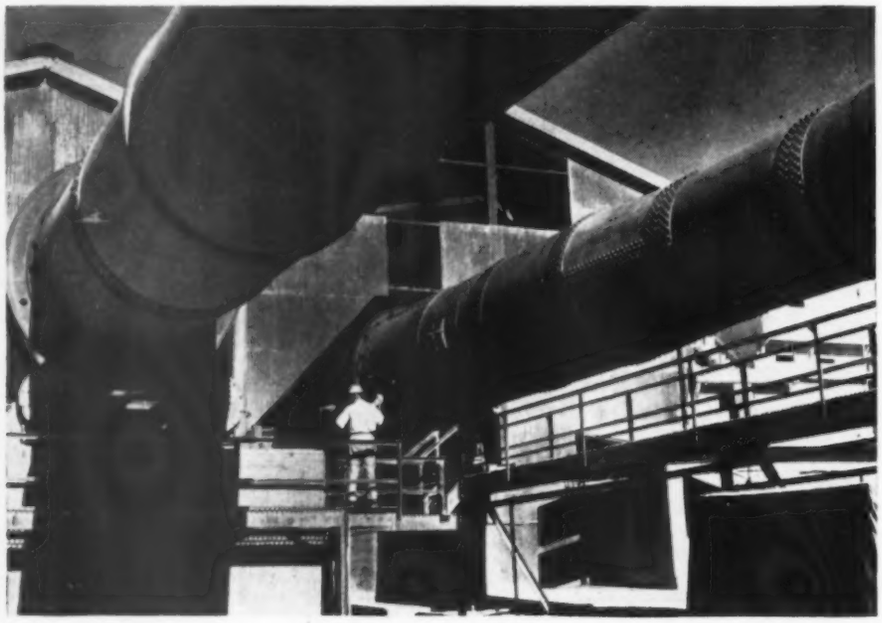
A force of 185 men is required by the cement plant. Cement sells for $3.60 to $3.80 per bbl. at the plant. The costs, as may be expected, are much higher than those of the prewar days; namely, 1936 and 1937. Oil costs $2.50 per bbl. as against $1.25 to $1.30. Purchased power is now 1½¢ per kw. hr. against the old rate of ½¢. The plant requires about 17 kw. per bbl., which is about in line with the original plans. The gypsum used comes from Nova Scotia, and costs $11 per ton delivered.

Now unskilled labor is 45¢ per hour or $3.60 per day of 8 hrs. against the former rate of $1.20 per day. Skilled labor, mechanics, electricians, etc., now are paid $40 per week against $18 per week for the highest class in 1936 and 1937. Packers are paid hourly rates only.

The plant is operated under the direction of David S. Ramirez, president; Jose R. Benitez, vice-president and manager; and Jose B. Rodriquez, superintendent. The chief chemist is Jose E. Berrocal. John L. Schnitzer, chief chemist of the original plant, who organized the chemical department, passed away a few years ago and his assistant, Carlos Cintron, is now superintendent of the Ponce Cement Corporation plant at Ponce. Mr. Benitez and Mr. Rodriguez were extremely kind in showing me over the plant, and Mr. Ramirez supplied a great deal of valuable information.

*Works Manager, Glen Falls Portland Cement Co.

Looking down from the mountains at the Ponce Cement Corporation plant. Raw material storage, left, with kilns in the background



Showing Puerto Rico Cement Corporation plant after installation of second kiln

Illustrations shown here were supplied by the Photograph Division of the Insular Government.

In spite of the extreme rise in the cost of labor, oil, power, and supplies, the margin of profit is more than sufficient to make any American cement manufacturer feel sure that Puerto Rico is indeed the "Isla Encanto," the enchanted island, and "Don David's" pot of gold was in the coral limestone and not in the mountain streams or copper stained volcanic rock.

Ponce Corporation Cement Plant at Ponce P. R.

After a pleasant visit with many old friends, including my former accountant, Noceda Garcia, I arranged to take the plane to Ponce. It formerly required about five hours in a beautiful, thrilling, and rather dangerous auto trip to go from San Juan to Ponce over the narrow roads with no guard rails and many reckless drivers. In most cases your chauffeur would attempt to see how close he could come to approaching cars without hitting them or being hit and pushed over the bank with a fall of 500 ft. or more.

The plane, however, was very comfortable, only requiring 20 minutes, and gave us a very fine view of the mountains and picturesque villages in the valleys. The plant is a short distance from the center of the town of Ponce.

The cement plant is controlled by the Ferre family, who own the Puerto Rico Iron Works. Antonio Ferre is president; Luis Ferre is vice-president and manager; Jose Ferre, vice-president and sales manager, and Rafael Valle, engineer. The plant is located on the side of a hill with a beautiful view of the Caribbean Sea.

Originally the installation included a Traylor kiln, but later an F. L. Smidth 9½- x 330-ft. Unax kiln was installed bringing the capacity up to 2800 bbl. per day.

At present, a third kiln is being installed, an F. L. Smidth 9- x 6- x 330-ft. Unax kiln, to bring the capacity up to 4200 bbls. per day. The aerial view and plan show the present kilns and mills with additions.

It may be interesting to note that some of our government geologists stated that A.S.T.M. specification cement could not be manufactured at the Ponce area, owing to the large amount of high magnesia pebbles intermixed with the coral limestone. However, the plant is now manufacturing a very fine Type I cement with strength well above A.S.T.M. specifications.

Quarry and Clay Pit Operations

A hill of coral limestone about 500 ft. or 600 ft. high is worked in terraces with the haulage road following contours and easy grades to the top of the mountain. A Diesel crawler-type shovel is used to load trucks which deliver the stone to the crusher well above the general plant level. The rock is barred down—no shooting is required. The company is especially fortunate in having located a fine, thick bed of high grade silica about 40 ft. or more in thickness on the top and rear side of the limestone hill. The clay pit is down near the main highway from Ponce at a convenient and easy haul to the raw mill.

The mix consists of coral limestone, clay, sufficient sand to bring the silica content up to the proper amount. The mix requires about 40 per cent water to handle it in the Wilfley pumps and pipe lines.

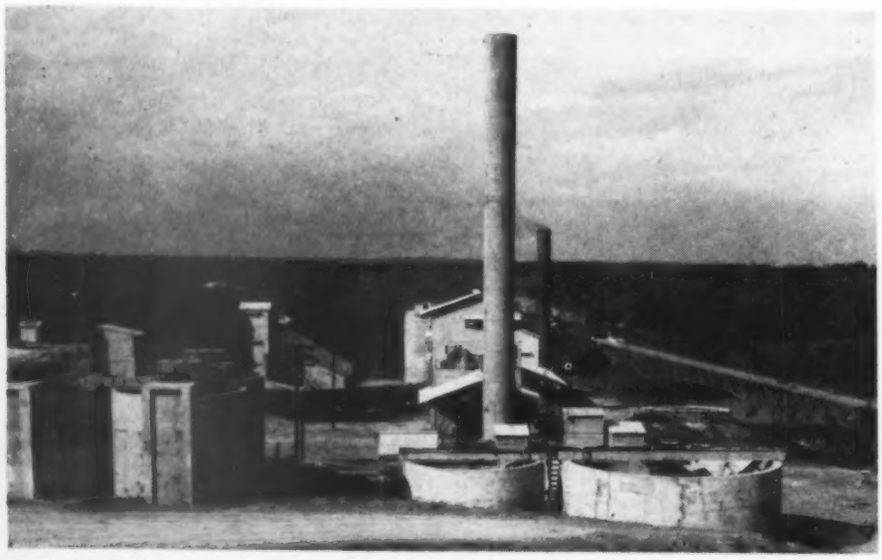
Crushing Equipment

Rock is crushed in a Pennsylvania hammer mill. The stone does not contain much clay. Additional finish and raw mills are being installed to take care of the larger capacity required by the installation of a third kiln.

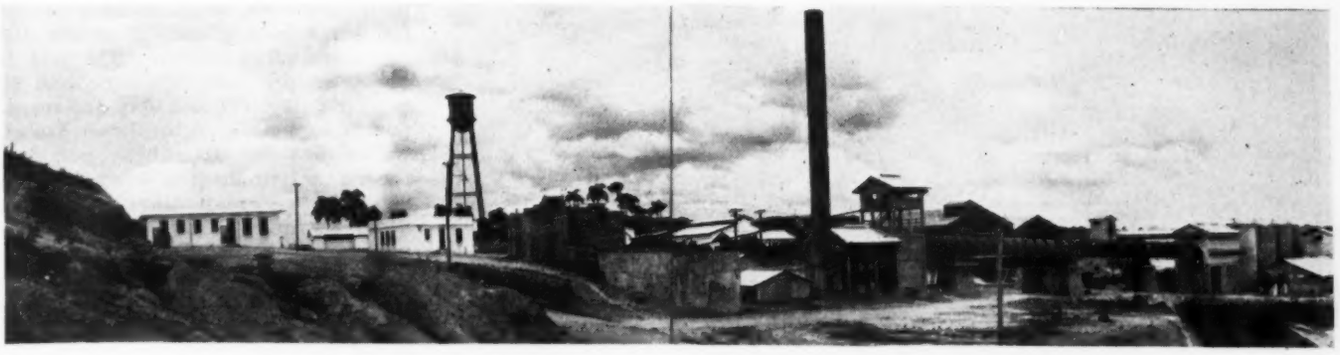
Kiln Burning

Oil used for kiln fuel costs $2.40 per bbl. About 9 gal. oil are required per barrel of clinker. Purchased power is 9¢ per kw. hr. and about 18 kw. hr. per bbl. of cement is required. The kilns are lined with General Refractories fire brick.

Common labor is paid 42¢ per hour, 40 hours per week, or $16.80. Skilled labor, mechanics, electricians, kiln burners, and operators receive about $1 per hour or $40 per week. The labor force is about 190 men. The packers and packing department labor are simply paid straight hourly rates.



Showing slurry tanks, kiln, and cooler of Trujillo cement plant with mill building and cement storage silos in the background. Bridge, to the right, crosses Isabel river



Panorama view of Trujillo City Cement Plant with slurry tanks to the left and mill building in the background

The company pays for insurance and hospitalization on all its employes.

Cement is loaded by the packing crews on trucks and sells for $4.40 per bbl. delivered on short distance hauls.

The Ponce Cement Corporation owns and operates an ocean-going vessel to transport cement. This ship is 319 ft. overall length by 49 ft. 4 in. beam. Its dead weight tonnage is 4917 tons and gross tonnage registered is 3133 tons. The speed is 12 knots per hour. It has three hatches.

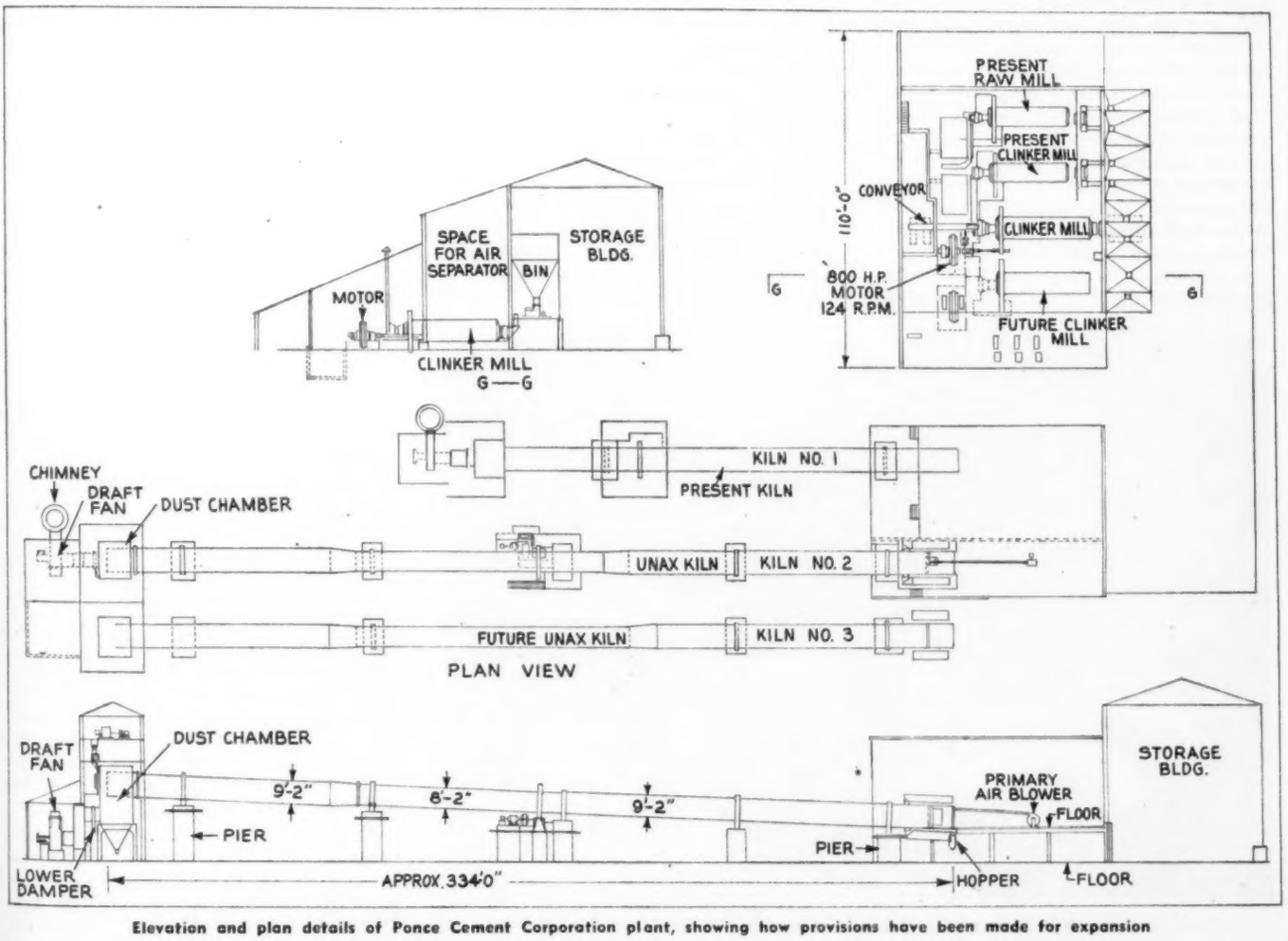
The vessel is used to export cement to nearby ports and to the Dominican Republic. On the return trip from the Dominican Republic, it is loaded with gypsum and other raw materials and supplies needed in Puerto Rico. The Santo Domingo gypsum is low in SO_3 and is very expensive, costing about $20 per ton delivered, including all freight charges, but even so it is more economical than having the ship make a return trip with a light load.

The Ponce plant is under the direct supervision of Oscar M. Girod, works manager, and the former chemist at the San Juan plant, Carlos L. Cintron, is now superintendent of the Ponce plant. The chief chemist is Oriol Yordan. To all of these gentlemen I wish to express my appreciation for showing me the plant, quarry, and new construction work.

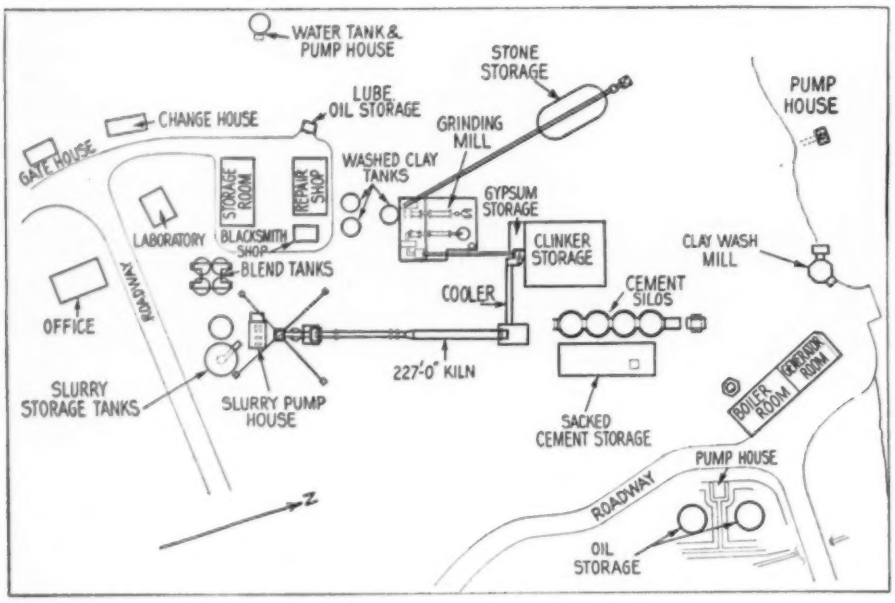
Trujillo City Cement Plant

This new cement plant, which was designed and constructed for the Dominican Republic by The Foundation Company of New York, is located on the Isabel river about five or six miles from Trujillo City, Dominican Republic.

Modern buildings, both government and others, and the magnificent hospital and the beautiful Capitol building are quite a surprise to the average tourist. The city is extremely clean, and the people are better dressed and clothed than is the case in many West Indian Islands. Jaragua Hotel, one of the finest in the West Indies, is mod-



Elevation and plan details of Ponce Cement Corporation plant, showing how provisions have been made for expansion



Lay-out of Dominican Republic cement plant

ern in every respect, and the service and food are excellent. It faces the Caribbean Sea and one would have to travel a long ways to find a place more generally enjoyable to spend several days or weeks.

Power plant facilities for the cement mill comprise three 360-hp. Babcock & Wilcox Stirling boilers. Fuel is oil, and the boilers are each equipped with two Peabody straight mechanical oil burners using Bunker "C" fuel oil under forced draft. A combustion control system maintains constant steam pressure, regulates fuel and air supply to the burners in a fixed ratio for maximum efficiency. Steam pressure of 150 p.s.i. is used to drive two 750-kw. Allis-Chalmers and one 500-kw. Allis-Chalmers turbogenerators, and electric current is developed at 2400 volts, 3-phase, 60-cycle. Condensing water for the turbines is delivered by a pumping station on the Isabel river.

The plant requires about 18 kw. hrs. per bbl. of cement produced. Three 500 c.f.m. air compressors supply the necessary air for slurry agitation and the Fuller-Kinyon cement pumps. The power cost is necessarily high owing to oil fuel and the small size of the power unit. However, as a sufficient supply of power is not available from any large public utility unit, it was necessary to produce its own power.

Rock is the usual high lime coral limestone containing 90-95 per cent $CaCO_3$. The magnesia content is low, varying from 0.6 per cent to 0.8 per cent. Clay beds, located about six kilometers distant on the Isabel river, are high in iron oxide and sufficiently low in alumina oxide to make a good mine. However, occasionally some silica sand is required to secure the necessary silica content. The mix is about 80 per cent limestone and 20 per cent clay. Oil and clay are transported to a dock on the River Isabel.

Designed for 1000 bbls. per day, the annual production is about 300,000 bbls. per year, allowing for the necessary general and heavy repairs and consequent shut-downs to make these repairs. A Diesel crawler type shovel of 1½-cu. yd. capacity loads the limestone into trucks for delivery to the crusher.

Rock Crushing and Clay Washing

The crusher is a Pennsylvania hammer mill "Thor" type, driven by a 150-h.p. motor, and has a capacity of 45 t.p.h. Then the crushed rock is delivered to a covered storage house which has a capacity of approximately 3000 tons of crushed rock.

A 100-ton capacity clay barge delivers the clay on the Isabel river to the F. L. Smidth wash mill of 1880 cu. ft. capacity. There are three clay slip and storage tanks, two of 6500 cu. ft. and one of 3456 cu. ft. capacity. The raw mill and finish mill are located very efficiently in one building. The raw department consists of one 6- x 10-ft. Allis-Chalmers ball mill, 22.4 t.p.h. capacity, followed by a Bethlehem Foundry and Machine Co. 7- x 24-ft. tube mill of the same capacity.

Slurry Tanks and Storage

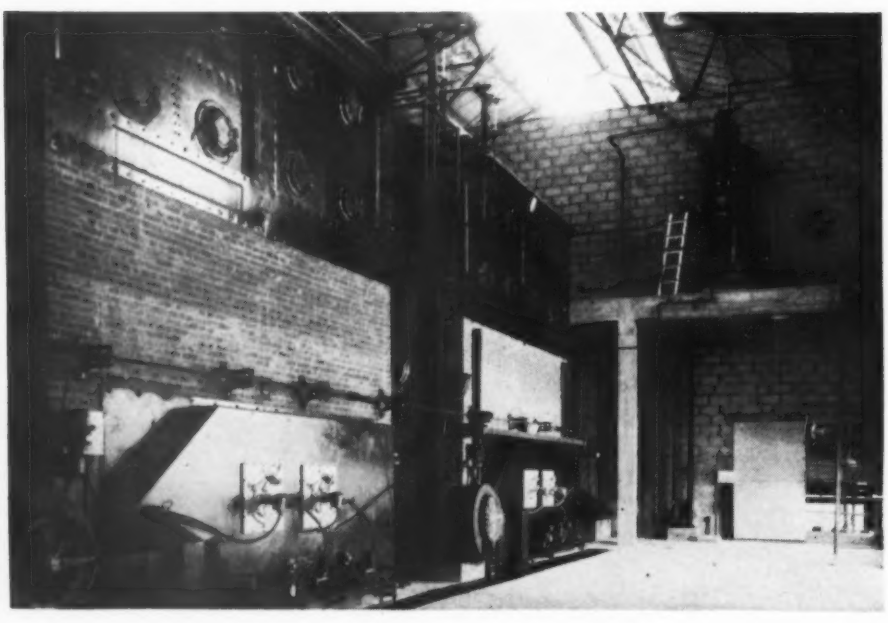
Slurry is delivered by Wilfley pumps to four slurry blend tanks, about 6000-cu. ft. capacity each, and the checked and approved mix is then delivered to two slurry storage tanks, one of 7769-cu. ft. and one of 24,000-cu. ft. capacity, or enough for three days' supply for the kiln. Moisture content of the slurry is high, being about 40 per cent owing to the nature of the coral limestone and clay, which is very sticky and colloidal.

Kiln Operation

The kiln, which is 9½- x 8- x 227-ft., is fired by a Peabody straight mechanical oil burner using Bunker "C" fuel oil under forced draft. Complete draft, temperature and combustion control indicating devices are provided to produce clinker efficiently and use a minimum of high priced fuel oil. An induced draft fan of 25,000 c.f.m. exhausts the waste gases to a 7½-ft. diameter steel stack.

Hot clinker from the kiln is delivered to an 8- x 80-ft. rotary cooler, which is lined for the first 40 ft. with fire brick, and has lifters for the balance of the length. This cools the clinker sufficiently so that it can be handled in the finish mills.

The clinker is delivered by an overhead car to clinker storage which has a capacity of 25,000 bbls. The same building provides a gypsum storage of 40 tons of gypsum, which is secured



High pressure boilers supply steam to power house

from deposits nearby but is low in SO_3, being around 33 per cent SO_3.

Finish Mill

An Allis-Chalmers Superior McCully gyratory crusher with a capacity of 30 t.p.h. is used, alternately, as a preliminary crusher for both clinker and gypsum. Gypsum and clinker are delivered to separate storage bins, fed into and proportioned by Schaeffer Poidometers, and then the mixed clinker and gypsum is conveyed to a 6- x 10-ft. Allis-Chalmers preliminary ball mill, capacity 100 bbls. per hour, and the cement is finished in a 7- x 24-ft. Bethlehem Foundry and Machinery Co. tube mill, also of 100 bbls. per hour capacity. A 14-ft. diameter Sturtevant air separator is in closed circuit with the tube mill and rejects from the separator are returned to be reground. The finished product is delivered to the cement storage bin and bulk loading bin by a Fuller-Kinyon pumping system.

Cement storage consists of four concrete silos of 25,000 bbls. capacity, and a bulk storage bin, 240 cu. ft. capacity, for loading bulk cement over a truck scale.

The pack house consists of one Bates 3-tube packing machine, capacity 720 sacks per hour. A very efficient Northern blower dust collector system has been installed, and the pack house is clean and free from dust.

Oil storage tanks of 100,000 gal. capacity are provided for fuel in power production and for burning clinker.

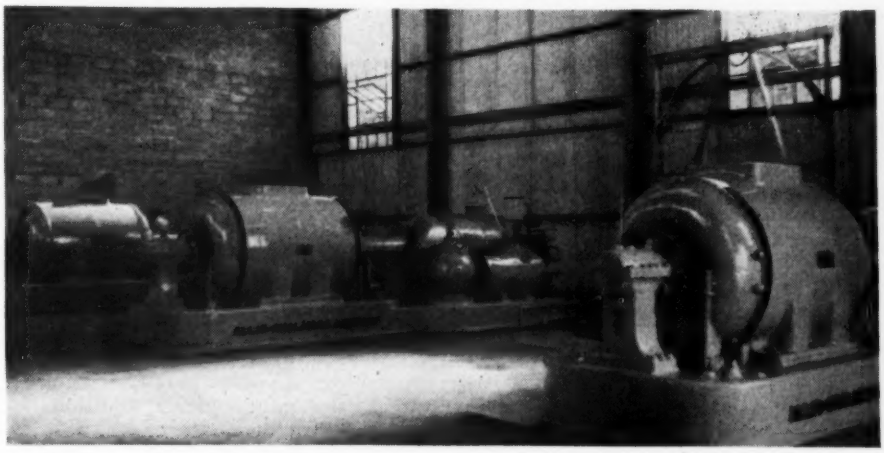
Modern Office and Comfort Facilities

The main office is a well-constructed and well-equipped structure with offices for the plant manager, accountants, paymaster, superintendents, master mechanics, and electrical superintendent. In another building are the chemical and physical laboratories which are supplied with all the modern laboratory equipment for analytical control and chemical and physical testing.

There is a change house and wash room for the men; also a well-equipped machine shop, blacksmith shop for maintenance work, a storeroom, and an oil storage house.

Water obtained from Trujillo City is stored in a 30,000 gal. tank located at a sufficiently high elevation to supply water by gravity to the boilers, and for the wet mix as the Isabel river is slightly brackish owing to ebb and flow of the tides from the Caribbean Sea into which it flows.

Cement produced is low in magnesia, under one per cent, with an alumina content of 4.5 to 5 per cent. Only Type I cement is being made at present. The clinker produced is very fine and looks to be of high quality with no evidence of underburned material in it. The typical cement strengths obtained are: one day, 160 lbs.; 7 days, 250-300 lbs.; and 28 days, 500-600 lbs.



Turbo-generator installation in power house of Trujillo cement plant

Costs of cement per barrel are naturally high owing to several factors: first, the small capacity, 1000 bbls. per day; secondly, the fuel oil for burning and power costs $2.50 per bbl. However, the common labor rate is low, $1 to $1.25 per day. Mechanics and other skilled labor pay varies from $2 to $4 per day. The Dominican Republic gypsum, delivered in lumps around 6-in. and under, costs $9 per ton but it contains only 33 per cent SO_3.

Built during the war when it was impossible to obtain any new machinery, it is a very creditable job when everything is taken into consideration. It is well designed and constructed, and in view of the large demand for cement and the consequent high price obtainable should prove a very profitable undertaking. This country is experiencing the same difficulty we are having in the United States in securing prompt delivery of necessary repair parts, and it is therefore a problem to maintain uniform and steady production. The long distance from the manufacturers in the United States, and the fact that there are no local foundry or machine shops available, except for sugar mill work, adds materially to the problem.

About 140 to 150 men are employed. Oil consumption is about 1,500,000 B.t.u. per barrel or about 10 gal. of oil per bbl. The power per bbl. closely approximates 18 kw. hr. Even with high costs of fuel and power and small production compared to United States plants, it is a simple matter to estimate what a really profitable undertaking this plant is when it is taken into account that cement sells for around $5 per bbl. and even if United States plants should attempt to compete, they would not be able to deliver cement to the Dominican Republic for less than that figure at present prices F.A.S. New York, including present steamer freight rates, loading and unloading charges, from New York to Trujillo City.

It is my understanding that the Trujillo government has quite an elaborate building and road program planned so it is very likely that the plant will be enlarged to two or three times its present capacity to meet all the demands upon it.

I was shown over the entire plant by M. M. Smith, plant manager. Mr. Mario Penzo represented the secretary of public works, and Huberto Bogaert on the construction of the work for the Dominican Government. Mr. Smith is assisted by Donald Hinkel, general superintendent; Louis Marazi, master mechanic; and Emrys M. Williams, electrical superintendent. I want to express my appreciation to all these gentlemen for their cordial reception to me and for the information which they supplied, and to Mr. C. McDonogh, vice-president, of the Foundation Company of New York for their val-

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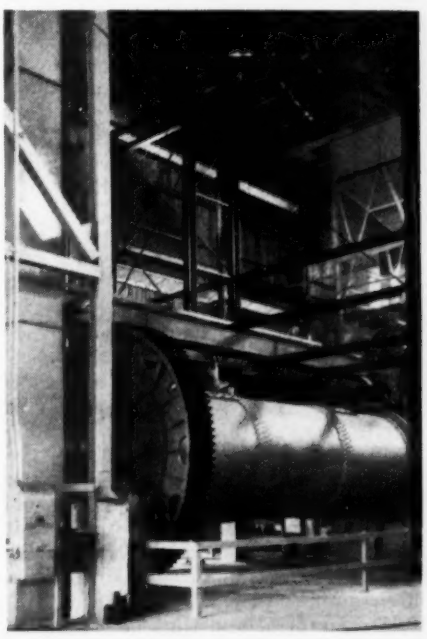

Section of raw and finish mill building of Trujillo plant with tube mill in foreground

Chemist Corner

POZZOLAN CEMENTS

By EUGENE A. LEDYARD*

ACCORDING to Webster a "pozzolana" is "a loosely compacted siliceous rock of volcanic origin, or tuff." "Tuff" is defined as "a rock composed of the finer kinds of volcanic detritus, usually more or less stratified, and in various states of consolidation."

The above definition, which is the earliest conception on record, certainly applies to the pozzolanas used as additions to hydraulic limes by the Greeks and Romans to improve the hydraulic qualities of the mortars used in constructing their ancient buildings and highways, many of which are still standing. However, today, there are a number of so-called pozzolanas which are used interground with portland cement clinker that do not conform strictly to Webster's definition. Some of these are: diatomaceous earths, calcined clays, calcined shales, artificial or synthesized pozzolanas manufactured in at least one or two cement plants in this country, and in some instances blast furnace slag. F. M. Lea, well-known British authority on portland cements, has given a broader definition for pozzolana which includes materials other than those of volcanic origin; that is, "siliceous materials which though not cementitious in themselves, contain constituents which at ordinary temperatures will combine with lime in the presence of water to form compounds which have a low solubility and possess cementing properties." It is believed that in this country, this definition among men of the portland cement industry more nearly approaches the present day conception as to what constitutes a pozzolana. There is a wide variety of pozzolanic materials in this country which satisfy Lea's definition in varying degrees, and these are used as admixtures for portland cement clinker to produce portland-pozzolan cements.

On the West Coast, principally California, is centered the largest production of portland-pozzolan cements, and some has been manufactured in the South, in areas where natural pozzolonas are readily available.

The cement industry as a whole has rather frowned on the promotion of portland-pozzolan cements possibly owing to the fact that not many natural pozzolans are available in the East and Middle West. It has generally been claimed by the industry that adding pozzolanic materials to portland cement was simply diluting a high quality product with a very inferior material and thus obtaining an end product of only mediocre quality. Investigations of portland-pozzolan cements carried out by the industry in this frame of mind have been directed rather to show that this type of cement is an inferior product, than from a constructive angle directed to ascertaining how portland cements might be improved by additions of some pozzolanic materials.

Pozzolan Cements Have Excellent Service Records

It is realized that some pozzolans are superior to others. Portland-pozzolan cements manufactured from the better grades of pozzolans have given excellent service records, especially in localities where sulphate resistance, alkali soil resistance or resistance to sea water action have been important factors. Strengths of portland-pozzolan cements while not spectacular at early ages, yet are sufficiently high not to delay construction unduly, at the later ages continue to gain in strength through ten years or more; while many straight portland cements, especially those finely ground, have a tendency to retrogress in strength at this age. From this fact it appears that the pozzolan may exert a stabilizing influence on portland cement.

The effects of the alkali-aggregate reaction, first observed and studied by Thos. Stanton of the California highways department and later by the Bureau of Reclamation in connection with Parker Dam, has since been observed in the Northwest and at least is suspected of being present at a number of scattered points in the East. In the areas where trouble was encountered due to reactive aggregates, specific limits were placed on the total alkali, as Na_2O, which would be allowed in portland cements. The limit was set at 0.6 per cent total alkalies calculated as Na_2O, which is in many cases a considerable burden on the manufacturer.

Mr. Stanton and the Bureau of Reclamation, and others have noted that some pozzolanic materials ground-in with portland cements have been effective in eliminating expansion due to the alkali-aggregate reaction. This is not true for all pozzolanic materials even when the pozzolana is satisfactory in other respects.

The Bureau of Reclamation is at this time faced with an aggregate situation in connection with the building of a dam where they do not feel that they can be safe using portland cement with up to 0.6 per cent total alkali as Na_2O present. They do, however, feel safe in using a suitable pozzolan which they know will take care of the situation, and they are proceeding to do this.

Federal authorities, realizing that portland-pozzolan cements are coming into greater use, have drawn specifications to cover this type cement, even though the specification still leaves considerable to be desired. The American Society for Testing Materials has long realized the growing importance of this type cement, but as yet have not been able to draw up a specification to their liking, due principally to the present lack of a suitable test for "pozzolanic activity."

Since at this time it is quite clear that portland-pozzolan cements are serving well a definite and important need, in spite of our comparative ignorance of the fundamentals concerning them, and, it has been absolutely necessary to use them to prevent alkali-aggregate reaction in some extremely bad cases; it appears that the time is over-ripe when the portland cement industry should realize the importance of these implications and lend their support and talents to a complete and constructive study of pozzolanic materials and portland-pozzolan cements.

If this problem is approached with the proper attitude, it is entirely possible that a portland pozzolan cement would be developed which would exceed in performance any cement that has been developed to date, from the standpoint of durability and workability.

Dr. Bogue, in his recent book, "*The Chemistry of Portland Cement*," points out, p. 520, "The chemistry of pozzolanas is still unsolved, and extensive systematic investigation with the tools of modern physical chemistry is required. And only when the chemical action is completely understood will it be possible to design a "pozzolan" of ideal composition for any particular purpose."

Manufacture Pozzolanic Materials

A few portland cement manufacturers have already "designed" and are manufacturing pozzolanic materials of their own. Herein lies the hope for those manufacturers operating in localities where natural pozzolans are not available. The raw materials necessary to the manufacture of an artificial pozzolan are available where cement raw materials are available, and the fuel requirements for forming the desired compounds in a pozzolana would be considerably less than that required for forming portland cement clinker compounds, since only a relatively small amount of lime is used. Hence, a relatively cheap product is probable.

There are many things that we should know about pozzolanas which a research program by the cement

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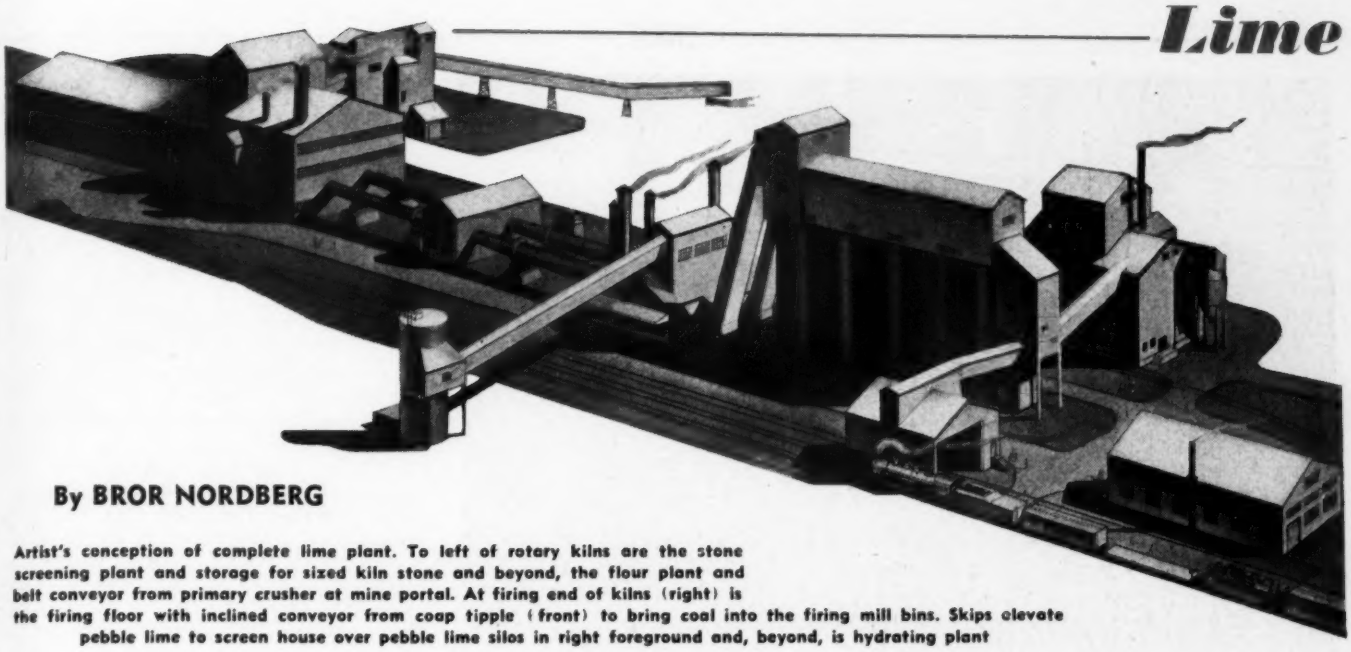
*Exec. Chemist, Monolith Portland Cement Co. and Monolith Portland Midwest Co.



By BROR NORDBERG

Artist's conception of complete lime plant. To left of rotary kilns are the stone screening plant and storage for sized kiln stone and beyond, the flour plant and belt conveyor from primary crusher at mine portal. At firing end of kilns (right) is the firing floor with inclined conveyor from coal tipple (front) to bring coal into the firing mill bins. Skips elevate pebble lime to screen house over pebble lime silos in right foreground and, beyond, is hydrating plant

AUTOMATIC CONTROLS

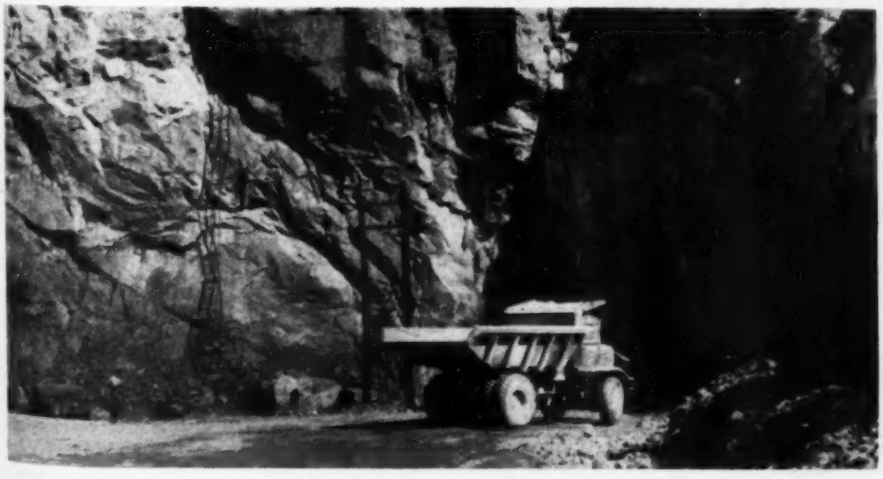
Applied to Lime Manufacture

National Gypsum Co., completes one of the largest rotary kiln lime plants in the country. Mine limestone selectively for chemical lime

THE NEW CHEMICAL LIME PLANT of National Gypsum Co., Kimballton, Va., which began production in September, 1947, is the result of more than two years of engineering and research by National's top technical personnel. It is one of America's largest rotary kiln lime plants and, being the newest, the extent to which modern operating practices have been adapted to achieve the ultimate in uniform high quality of product and large output is indicative of the probable trend in lime manufacture.

National Gypsum Co., in purchasing the Kimballton Lime Co. late in 1944, acquired one of the highest grade limestone deposits in the United States and, through its selection of equipment, plant design and the application of automatic regulation of processing and instrumentation has sought to transform an extraordinarily uniform high grade raw material into products of comparable high grade for chemical markets in the Southeast.

Kimballton is located in Giles county, 60 miles almost due west of Roanoke, and is in the heart of the Appalachian mountains, far from any metropolitan center of population, but is accessible by the Norfolk and Western and the Virginian railroads and strategically located with respect to chemical customers. The stone is identified as "Five Oaks" limestone of Ordovician geologic age and was first exploited when a small crushed stone plant was built at the site in 1915 to produce crushed stone for burning into lime at Saltville, Va. Flux was produced during World War I and the Kimballton Lime Co., prior to sale of the property in 1944, produced lime in shaft kilns.

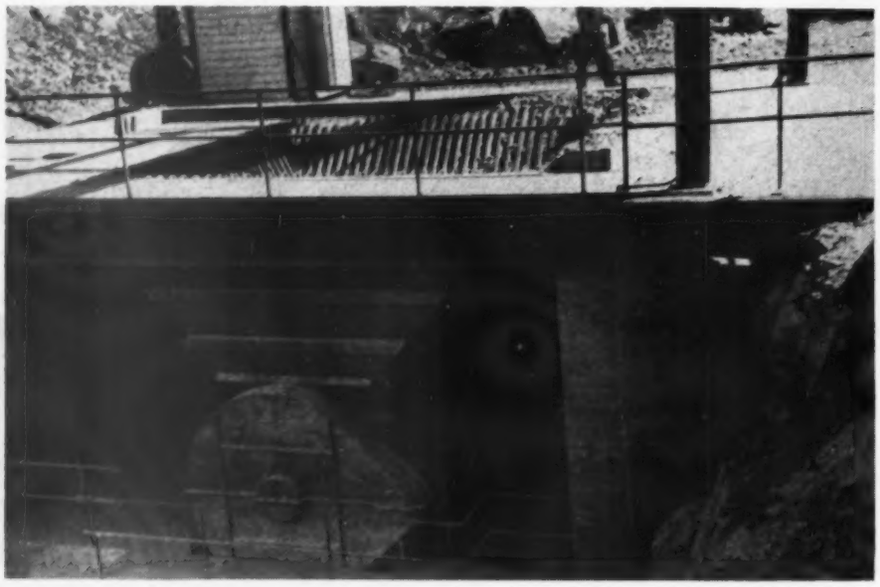


Mine portal showing one of Diesel trucks returning from primary crusher

Limestone mined selectively for the production of chemical lime has an analysis of 98 per cent $CaCO_3$. Magnesium carbonate is less than one per cent and there are uncommonly low percentages of iron, alumina, silica and phosphorous.

Principal industrial markets for Kimballton lime are the paper, carbide, leather, steel, water softening, tanneries and the general chemical industries. Other products are agricultural limestone, calcium carbonate feed supplement, pulverized limestone for mine dusting, agricultural hydrate and spraying hydrate.

The paper industry demands a fast slaking lime; low sulfur and silica



Primary roll crusher discharges into stone pocket from which stone is drawn out by belt conveyor

Three-level, self-propelled jumbo for drilling inside mine

One of several hydraulic reciprocating feeders used in plant to regulate flow of stone and lime on to reclaiming belt conveyors

content are required of flux for steel; high calcium content is essential for lime used for water treatment; freedom from grit and fast slaking properties are demanded by leather manufacturers; spray lime must be of high fineness and calcium content; feed supplement requires high calcium and low magnesia content; for dusting, a free flowing product low in silica is desired; while for soil treatment, ready availability is sought.

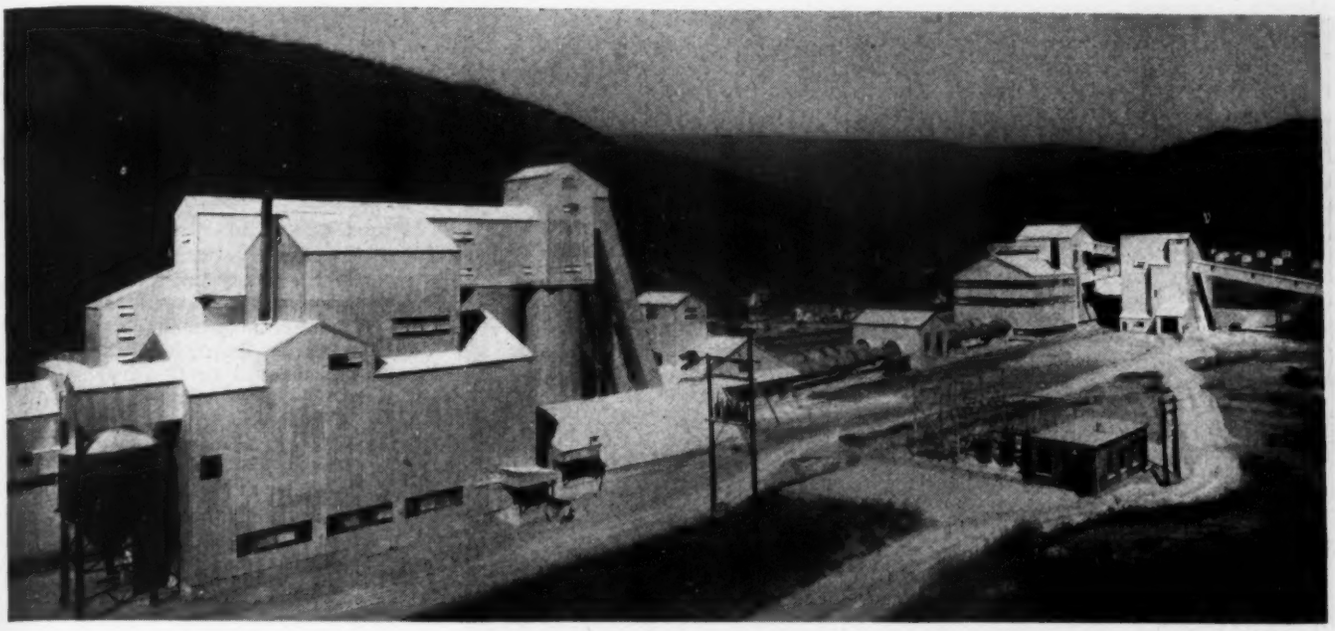
Chemical analyses of the several products are remarkably favorable for chemical use. Chemical pebble lime has a typical analysis (partial) of 96.34 per cent CaO (total), 1.05 per cent silicon dioxide and insolubles, 0.14 per cent iron and 0.01 per cent phosphorous; chemical hydrate analysis 97.38 per cent $Ca(OH)_2$, 0.81 per cent silicon dioxide and 0.008 per cent phosphorous and has a fineness of 98.9 per cent minus 325-mesh. Agricultural hydrate is pulverized to 89.6 per cent minus 200-mesh and spray hydrate has a fineness of 98 per cent through 325-mesh.

Agricultural limestone, 98.3 per cent $CaCO_3$, is ground to a fineness of 93.6 per cent passing a 100-mesh sieve; while pulverized limestone for mine dusting, etc., is pulverized to a fineness of 80 per cent minus 200-mesh and 63.8 per cent minus 325-mesh.

Ultimate capacity of the plant is expected to be 600 tons of pebble lime per day, and approximately 17 per cent of output of stone is converted into pulverized limestone. The plant expects to ship 75,000 tons of mine dust annually into the bituminous coal mines of West Virginia, Virginia and Kentucky.

The high calcium stone ledge outcrops along the valley wall of Big Stony Creek and dips 36 deg. under Butt Mountain, necessitating underground working. The strike is N 65 deg. E and the main tunnel entry now being carried forward (drift mine) will be extended 2000 ft. from a southwesterly direction headed to the northeast. The mine entrance is some 80 ft. above the ground elevation of the plant. High grade stone is available from the upper 70 ft. of "Mosheim" limestone, measured normal to the bed, which is overlain by "Lenoir" limestone of lower grade. The sloping line of demarcation between the two beds is the guide to miners in driving tunnels through, normally to the bed, tunnel No. 1 now being advanced so that it will continue to just cut a corner (upper right-hand) of the intersecting plane.

The mine is in the early stages of development, with one long tunnel being extended from which cross-cuts are driven to a second parallel tunnel, and workings will progress upward following the high quality stone, in preference to following the dip below the present tunnel floor. A grade of ½ of 1 per cent for truck hauling of



Over-all view of plant. In foreground is hydrating plant with pebble lime screening plant and storage behind it; at far end of rotary kilns are screening plant and, to the right, the flour plant. Note inclined conveyor on extreme right from primary crusher at mine portal

stone out of the mine is to be maintained.

Tunnels measure 34 ft. wide with a 19-ft. ceiling and are carried forward by firing a 12-ft. round (38 drill holes) to bring down 600 tons of stone per shift. The drilling pattern consists of five horizontal rows of holes spaced 5 ft. apart, with seven holes equally spaced in a row. The drill holes in the bottom row, at the floor, angle downward slightly, the holes in the row at the ceiling are inclined a little upward and V-holes 14-ft. apart are drilled at the center of the round, converging at 90 deg. angles to spring the shot.

A Jumbo drilling rig has been built on to a Linn half-track which was converted from gasoline power to a 40-hp. electric motor drive for spotting the rig. The Jumbo has two vertical columns each supporting Ingersoll-Rand drifters to drill at three levels. Cleveland wagon drills sink the drill holes near the bottom of a round. Blasting is done with 40 per cent semi-gelatine dynamite, using standard time delays. As the ceiling of the mine is worked upward following the high calcium ledge of stone, pillars are to be left and workings will progress from above. When that stage of development is reached, diamond drilling will be employed. The company has had an excellent experience record with diamond drilling at its Bellefonte, Penn., plant for the past several years.

Loading is done by a 1½-cu. yd. 362 Marion electric shovel, caterpillar-mounted, which has a short dipper stick and boom, into either of two Euclid end-dump trucks or a Koehring Dumptor, hauling 15 tons and 8 tons of stone, respectively. Truck equipment is Diesel-powered.

A 1324 c.f.m. Ingersoll-Rand air compressor supplies the air for drill operation, and a portable transformer inside the mine steps down the electrical supply line potential from 2300 volts to 440 volts. The mine will be operated on three 8-hr. shifts as the ultimate plant capacity is reached.

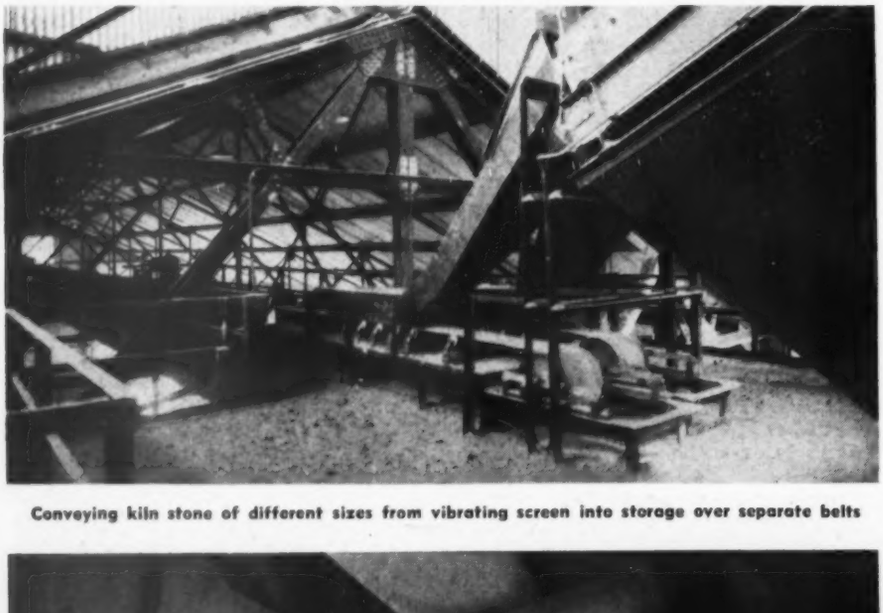
Outside the mine portal, the trucks dump into a hopper over a 30- x 60-in. Pennsylvania single-roll ribbed crusher, which is set to crush to minus 8-in. size. The crusher discharges into an 805-ton stone pocket from which the stone is drawn below for transportation by a 36-in. belt conveyor, 805 ft. centers, to the screening plant. There are two draw-off hoppers from which the belt is fed stone uniformly by Hannifan - Vickers reciprocating hydraulic feeders. The belt is of 36-in. Cincinnati belting, riding on Link-Belt idlers, with a Stearns magnetic head pulley, and inclines upward to discharge over a scalping screen in the main screening plant. Housed in a conveyor gallery, the conveyor idlers are piped for one-side lubrication. Belt speed is 125 f.p.m.

Screening Plant

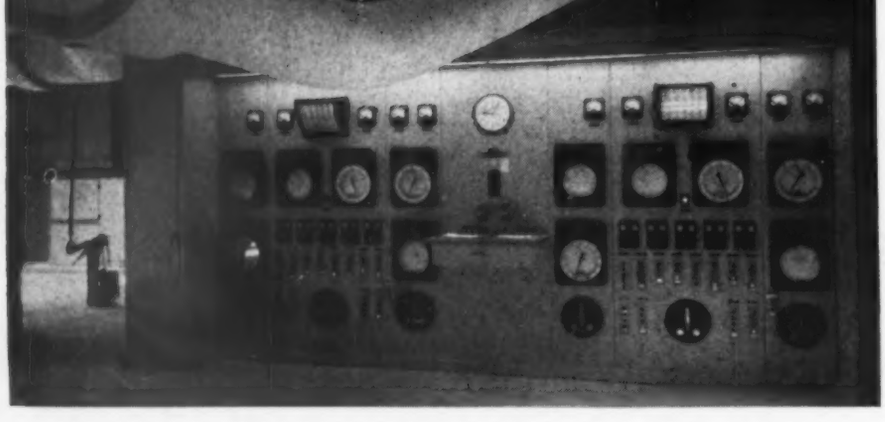
The screening plant adjoins a flour pulverizing plant where minus ⅜-in. fines and dust are diverted by belt conveyor for the production of mine dust and agricultural limestone. It consists of four Tyler double-deck vibrating screens, a 24- x 60-in. single-roll Pennsylvania reduction crusher, necessary belt conveyors and bucket elevators for handling, and covered storage for 1500 tons of sized kiln

One of two 300-ft. rotary kilns looking toward feed end. In background is housing for kiln drive

Interior of mine showing portal in background. Note incline of ceiling left in mining out high calcium portion of ledge



Conveying kiln stone of different sizes from vibrating screen into storage over separate belts



Control panel with indicating, recording and control instruments for operation of two kilns

stone. Kiln stone sizes are 1¾- x 2½-in., 1¾- x ⅞-in. and ⅞- x ⅜-in.

The first screen, a 5- x 10-ft. Ty-Rock scalper, makes separations at 4-in. and 8-in. Plus 8-in. stone is spouted to the crusher, while 4- x 8-in. stone can either be spouted into open-top hopper cars for shipment as flux stone or be diverted to the crusher. Minus 4-in. stone through the lower deck is passed over a 4- x 10-ft. Niagara scalper screen which makes a separation at 2½-in. and passes minus ⅜-in. stone to a belt conveyor for delivery to the flour plant. Plus 2½-in. stone is spouted to the crusher, and the ⅜- x 2½-in. size is rescreened over a 4- x 10-ft. Niagara Sizing screen into the three sizes of kiln stone.

All recrushed stone is elevated to a 5- x 12-ft. Niagara recirculating screen, from which plus 2½-in. stone is returned to the crusher, and minus ⅜-in. product is conveyed to the flour plant. Stone retained between the two decks (⅜- x 2½-in.) is passed over the sizing screen. The fine size of kiln stone is stockpiled and the other two sizes are carried into a long covered storage area by horizontal belt conveyors. A reclaiming tunnel belt conveyor is the means of withdrawal from storage for kiln feed.

Kilns-Coolers

The lime burning process is highly instrumentalized and has automatic control features new to the lime industry.

Calcining is done through two 8- x 10- x 300-ft. welded Allis-Chalmers rotary kilns, each of which discharges through an 8 ft. 6 in. Allis-Chalmers tubular rotary cooler. Each kiln is equipped to operate independently of the other. Kiln slope is ½-in. to the lineal foot and kiln speed is variable, with the rate of stone feed automatically regulated to conform.

An enlarged calcining zone diameter is instrumental to greater capacity through spreading the load out and providing greater surface, and is 100-ft. in length in these kilns, tapering for a distance of 20-ft. to the smaller diameter. Each kiln is completely lined and is insulated to within 70 ft. of the hood with the exception of the tapered section and the first 10-ft. of the kiln at the feed end.

Kiln lining starts with 9-in. high heat duty fire clay brick for the first 10-ft. of kiln length from the discharge. The next 60 ft. is lined with 9-in. 70 per cent alumina brick without insulation. Then follows 30-ft. of 6-in. 60 per cent alumina brick insulated with 2½-in. magnesia block and ¼-in. of insulating cement mortar on each side of the insulating block. The tapered section of the kiln is uninsulated and is lined with 60 per cent alumina brick of special shapes. The balance of the kiln to within 10 ft. of the feed end is lined with 6-in. abrasion-resisting brick and 2½-in. mag-

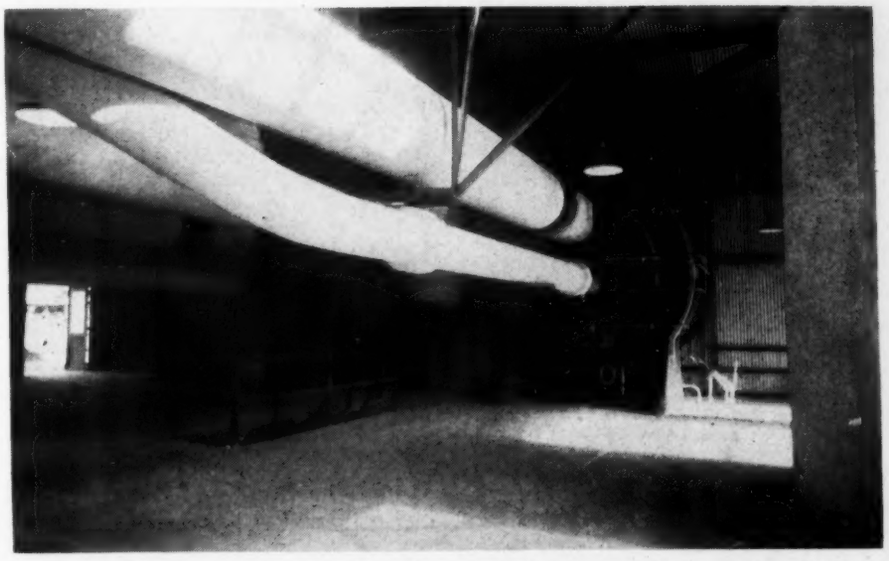
nesia block insulation and ½-in. thickness of insulating cement. The last 10 ft. is of 9-in. brick without insulation.

Each kiln is driven by a 4-speed electric motor through Falk gear reducer. The four speeds are 1.5, 1.12, 0.78 and 0.58 r.p.m. Alternative drive equipment, provided in case of electric power failure, consists of an Allis-Chalmers gasoline engine, with Twin Disc clutch and Link-Belt roller chain linked to the main drive gear. Both kilns are fired by pulverized coal and operate under induced draft. No. 1 kiln has an F. L. Smidth quadrant preheater while No. 2 kiln has an experimental arrangement whereby a standard Fuller inclined grate cement clinker cooler is being adapted to preheat stone. Exhaust gases from the kiln will be drawn through the bed of stone fed over the grate, from above, under suction from the induced draft fan. However, we emphasize that this is an experiment yet to be conducted. Balancing fuel savings against power consumption by the induced draft fan motor, and with the several sizes of kiln stone, will likely determine the feasibility of the installation. We further point out that the plant has not been in operation sufficiently long that optimum firing practice and kiln speeds have been determined, and the kilns have not yet approached their operating peak.

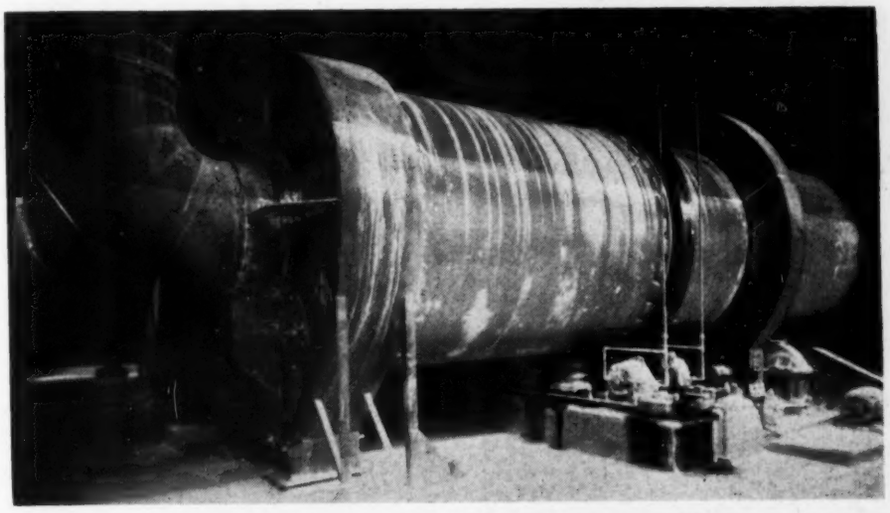
The coolers are tubular, indirect-heat transfer units, lime being carried forward inside the tubes to discharge, while cooling air is forced around the tubes from inlet pipes at the discharge end. One of two air inlet pipes introduces cooling air inside the discharge end of the cooler which enters a windbox at the midpoint of the cooler to exhaust into the atmosphere. Function of this cooling is to reduce the temperature of the lime to a favorable degree for handling.

A second inlet pipe introduces air beyond the windbox into the hot end of the cooler where there is a much higher temperature differential. This preheated air is the secondary air which supports combustion in firing the kiln. Lime enters the cooler at 1800 deg. F., a drop of 400 deg. F. from the peak temperature, and discharges at 300 deg. F. 15 minutes later. Cooler fans are No. 11 Buffalo Forge, identical to the induced draft fans on each kiln.

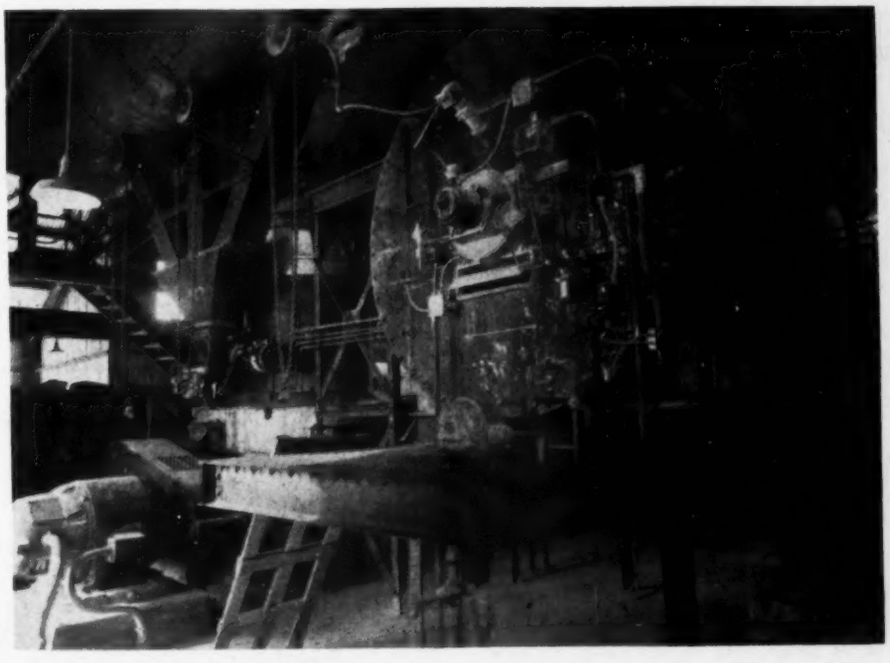
By use of a cooler under pressure and uncontaminated air for combustion, conditions are more ideal than ordinary for the maintenance of controlled burning conditions. Each kiln is fired by a Standard E-35 B. & W. direct-firing unit mill. A West Virginia Pocahontas coal of 14,200 B.t.u. heat value is used. It would be classed as a high volatile (30-32 per cent), low ash (5-6 per cent) coal and contains only 0.6 per cent sulfur. Primary air is drawn into the mills from the cooler stack and an automatically-



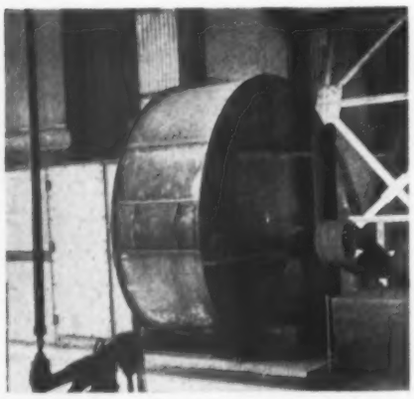
Firing ends of rotary kilns showing piping for primary air and secondary air, bottom and top



Tubular type lime cooler. Air is introduced at discharge end



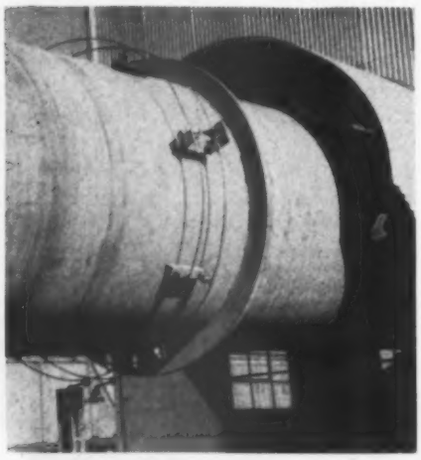
Oil-fired heating unit operated in conjunction with roller mills in grinding limestone flour



Fan to supply air into tubular cooler for preheating and use as secondary air in kiln

Portable transformer in mine

Automatic hoist for elevating lime from cooler to screens over pebble bins



Kiln is fitted with thermocouples at third point for temperature recording

operated tempering damper regulates the inlet air temperature to hold the primary air-coal temperature at 150 deg. F. in the mills from which it is injected into the kiln through water-cooled burner pipe. Fineness of grind is 85-87 per cent minus 200-mesh. The fire is started by an atomizer-type oil burner.

Kiln stone is drawn from covered storage on to a reclaiming tunnel belt conveyor, feed to the belt being regulated by hydraulic reciprocating feeders similar to those that feed stone to the primary belt to the screening plant. There is one unit, portable on rails with electric plug-ins throughout the length of the tunnel, so that stone may be drawn from any drawoff points. The belt transfers to a bucket elevator filling either of two 125-ton kiln stone bins.

Recording Merrick Feedoweights regulate, synchronously with kiln speed, the feed out of stone to be elevated and fed through feed spouts into the kilns. These feed regulators are 36-in. flanged belt-type units, with built-in. 2-hp. four-speed motors and with Reeves variable-speed transmission. Motor speeds are 1200, 900, 600 and 450 r.p.m., to conform with the four available kiln speeds and the motors are started and stopped at the kiln operating floor.

Stone is passed over a 3- x 8-ft. single-deck Tyler-Niagara "grit screen" before entering the kiln spouts. Fines passing ⅜-in. screen openings are conveyed to a 40-ton bin outside the plant and are shunted to the limestone flour plant, either by elevator to the transfer belt between the screening plant and the flour plant or by truck. A similar bin is provided for dust settled in large settling baffle chambers through which the kiln gases pass to the induced draft fans. Screw conveyors in the floor of the settling chambers gather these fines into the boot of an elevator that either transfers into the dust bin or to the flour plant conveyor. At present, stone to kiln No. 2 is by-passing the preheater and the kiln is being operated on natural draft. The alternate is for the stone to flow over the preheater from the screen and then enter the kiln feed spout, with the kiln gases entering the collecting chamber after passage through the inclined grate.

When full capacity production of lime is attained, a fuel ratio consistently in excess of 4:1 is anticipated. Kiln No. 1 with the quadrant preheater is operating with a lime-fuel ratio of 4.1:1 and kiln No. 2, under natural draft, has a 3.8-3.9:1 ratio. The kilns are presently turning at 1.12 r.p.m. Back end temperature, at the outlet of each kiln, is 1100-1200 deg. F. On a trial basis, with the auxiliary stone preheater operative on kiln No. 2, temperature of the exit gases at the induced draft fan measured 200 deg. F.

The primary air:coal ratio is 3 lb. of air per lb. of coal and the ratio of secondary air to primary air is 1½:1 by weight. Utilizing 4400 lb. of coal per hr. per kiln at the present rate of production, 15,200 lb. of primary air and 22,500 lb. of secondary air are put through each kiln. Secondary air is introduced at 500 deg. F. Exit gases contain 2-3 per cent O_2, 28-32 per cent CO_2 and 0 per cent CO. Ultimately, the goal is to fire the kilns with a hood draft as low as 0.02 in. or as near zero as practicable in order not to draw in appreciable quantities of cold air in preference to utilizing preheated secondary air.

Instrumentation

Kiln operation is controlled by a Bailey Motor Control System from an instrument panel on the kiln operating floor. The instruments are electronic devices that control, through pneumatic controllers, the various adjustments. At present each adjustment is made separately, but the controllers are so arranged that they can automatically make required adjustments to conform with a change made in one of the firing variables. For example, should the kiln burner increase the primary air flow in order to attain more heat, the coal feed rate, the secondary air flow and the induced draft would automatically change to the optimum figures. The plant is still operating on a preliminary basis and is limited on air capacity. Availability of an excess of secondary air, primary air and induced draft is essential to automatic operation of the adjustments in firing.

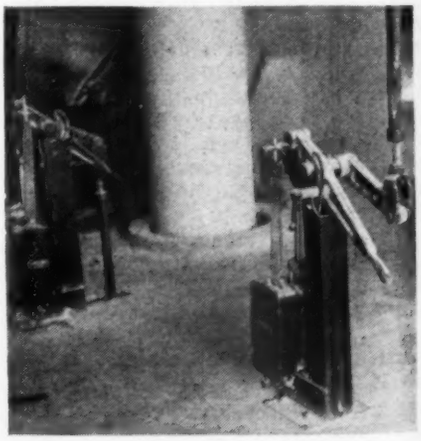
Metering equipment consists of the following:

A—Bailey fluid meter to record the primary air flow and the coal-air mixture temperature.

B—Bailey fluid meter to record the secondary air flow.

C—Bailey Pyrotron recorder to record and indicate the kiln temperature at the hood, and the kiln speed.

D—Bailey Pyrotron recorder to re-



Pneumatic control devices for automatic operation of dampers and other regulatory equipment related to kiln firing equipment. Control instruments on burning floor actuate these devices

cord the kiln temperatures at each of the third points, as measured by thermocouples.

E—Bailey Pyrotron recorder to record and indicate the kiln outlet temperature and the induced draft inlet temperature.

F—Bailey Oxygen recorder to record O_2 content of the gases leaving the kiln.

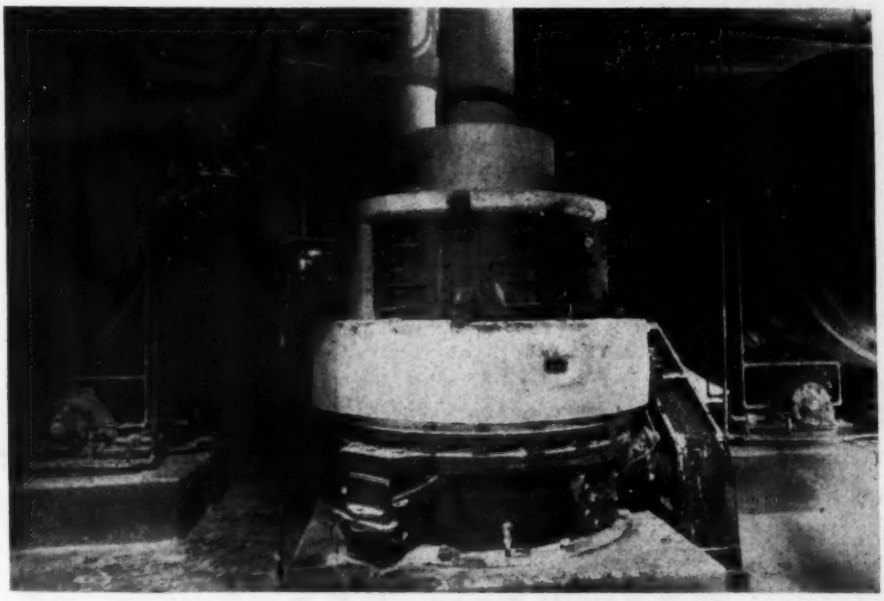
G—Bailey Multi-Pointer gage to indicate the primary air differential, mill differential, secondary air pressure, induced draft and hood draft.

Control equipment includes Bailey hand-automatic selector valves for induced draft, primary air, raw coal feed, secondary air, tempering air; and Bailey controllers for primary air-secondary air ratio, the pulverizer feeder, kiln hood draft, coal-air mixture temperature and the induced draft inlet temperature. Accessory instruments are ammeters for the kiln drive, rock feeder drive, induced draft fan motor, cooler fan motor and pulverizer drive; push button switches and signal lights, and an air failure alarm system.

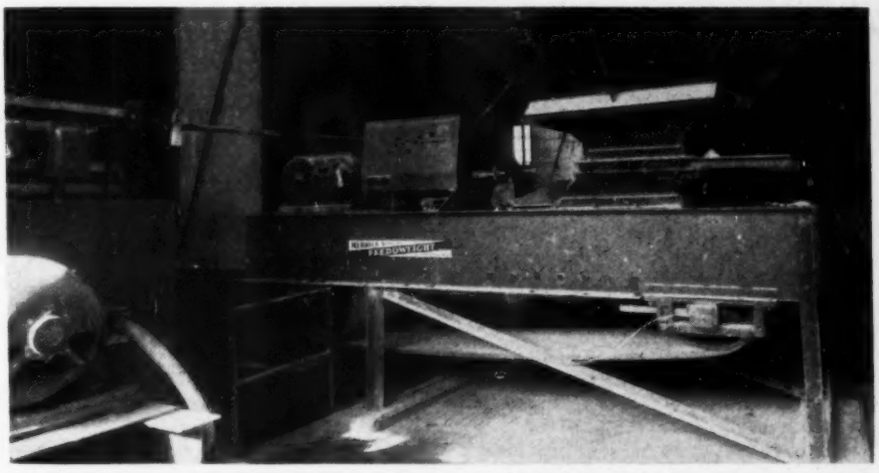
The primary air damper is regulated by remote manual control according to observations of the burner and temperature readings as indicated on the panel board. Coal feed ratio to primary air is maintained through regulation of the feeder knife by the pulverizer feeder controller which takes impulses from a primary air flow pitot tube and regulates the coal feed to hold a proportional pulverizer differential.

The secondary air damper is regulated by the fuel-air ratio controller which balances the primary air flow against that for secondary air. Readjustment of this ratio controller is done manually according to observation of the oxygen recorder in order

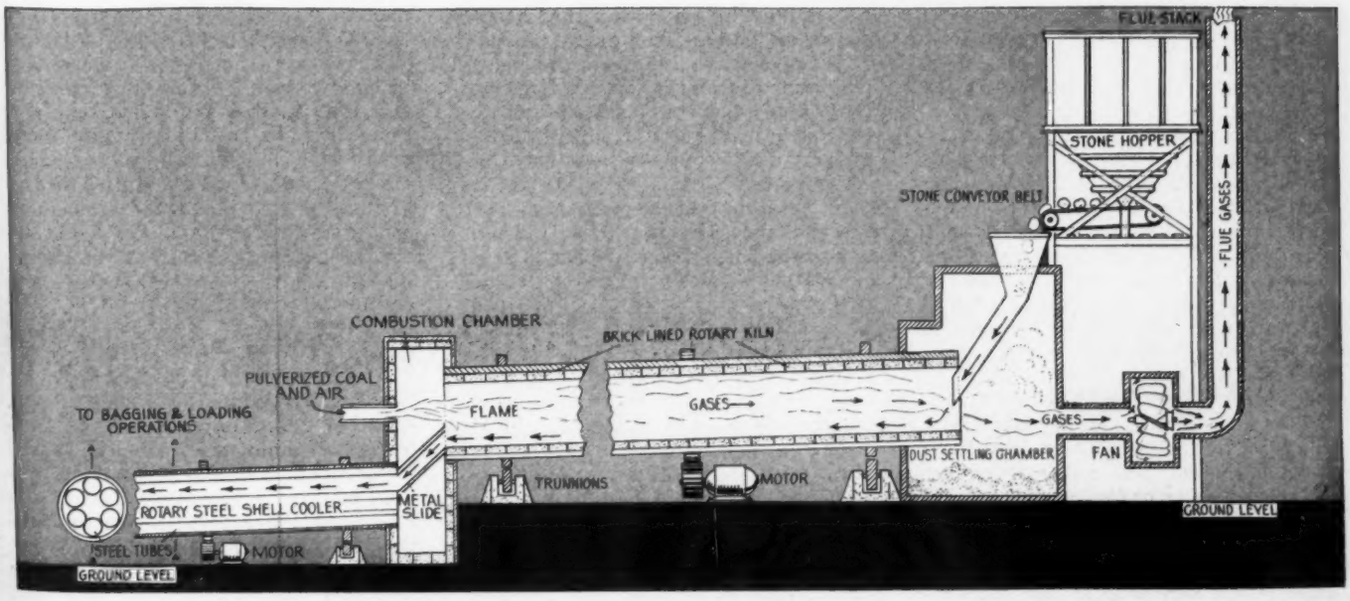
(Continued on page 154)



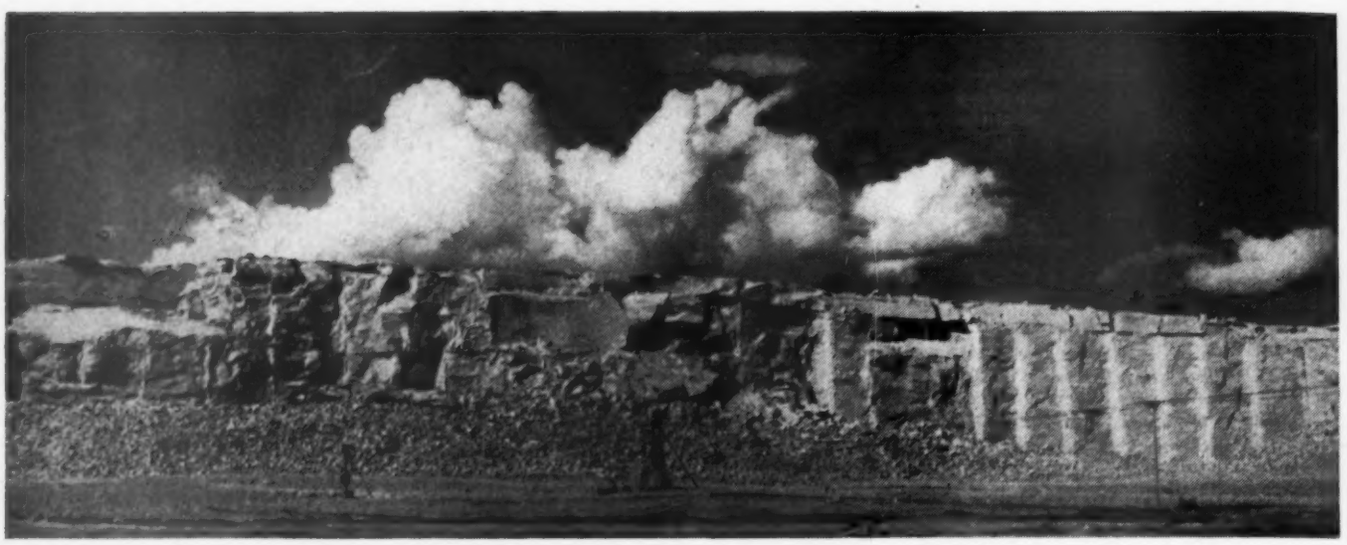
One of two direct-firing unit coal mills. On either side are the tubular type lime coolers



Feeder for kiln stone is synchronized with rotary kiln speed



Vertical cross section of rotary kiln installation; also showing tubular cooler, dust settling chamber, method of stone feed, and the flow of exhaust gases



Granite quarry of the Consolidated Quarries Corporation at Lithonia, Ga., visited by members of the Industrial Minerals Division, A.I.M.E. on one of the field trips. The unusual view shows part of the 2000-ft. face which rises 125 ft. above the quarry floor

Southern Meeting of A.I.M.E.

Industrial Minerals Division, A.I.M.E., meeting in Atlanta, Ga., Oct. 8 to 10, discusses latest operating practices. Field trips to quarries and mines

By OLIVER BOWLES

IN COOPERATION with the Southeast Section of the American Institute of Mining and Metallurgical Engineers, the Industrial (Non-metallic) Minerals Division, held a meeting at the Henry Grady Hotel, Atlanta, Ga., on October 8, devoted October 9 and part of October 10 to field trips in Georgia and Alabama, and concluded the meeting at the Tutwiler Hotel in Birmingham, Ala. The sessions were well attended with a registration of about 60 operators, engineers and geologists. This was the first meeting of the Division in Atlanta, and the local committee spared no pains to make it a successful and happy occasion for everyone. Every event of the meeting was unusually interesting and informative.

The first session, consisting of 5 papers, was held during the forenoon of October 8, with J. L. GILLSON, chairman of the Division, and POOLE MAYNARD, chairman of the Local Committee, acting as co-chairmen. CAPT. GARLAND PEYTON, State Geologist of Georgia, opened the session with a discussion of the industrial mineral resources of Georgia.

Lightweight Aggregates

POOLE MAYNARD, Industrial Geologist with the Atlantic Coast Line Railway, discussed the manufacture of lightweight aggregates from raw materials available in the Coastal Plain area. There is a big future for lightweight aggregates in this area because gravels are becoming scarce. Bentonite clays and fuller's earth are plentiful and are satisfactory although some of them may require addition of materials that will lower the fusion point.

Crushed Stone Industry

NELSON SEVERINGHAUS, superintendent of the Consolidated Quarries Corp. at Lithonia, Ga., presented concisely the modern trends in crushed-stone production methods. Granite is a very hard rock, and the labor required for its quarrying and preparation is much greater than that needed for equal tonnages of gravel or slag. It is imperative, therefore, that methods and equipment be so improved that the labor requirement will be substantially reduced. Hydraulic stripping is used wherever possible. Carbide-tipped drill bits have the advantage of losing gage very little as they descend, therefore the hole maintains size to the bottom where space is needed for the explosive. Fusion drilling is a future possibility. An important development in blasting is the use of short-interval delays in adjacent rows of holes. The time switch is more reliable than the delay cap. The jackhammer despised by workers has been displaced largely in secondary reduction of boulders by use of a 7000-lb. drop ball. One such ball will accomplish as much fragmentation as secondary blasting following six jackhammers. Large electric shovels and small Diesel-powered shovels are used for loading. A bulldozer is essential for effective moving of stored material. Feeders ahead of crushers are advantageous, and vibrating screens are replacing rotary screens. Wet screening has some advantages, notably in reducing the dust nuisance.

Sillimanite

KEFTON H. TEAGUE, of the T.V.A., described the sillimanite deposits of the southeast. Topaz is somewhat limited in supply and kyanite that will not decrepitate is scarce, hence, there is a big potential demand for sillimanite. The fibrolite variety is common in North Carolina, South Carolina, Georgia and Alabama. There are local concentrations of the massive or prismatic type. The sillimanite-bearing belt is over 240 miles long and several miles wide but only three areas offer commercial promise, one in North Carolina, one in South Carolina and one in Georgia. Some areas show concentrations up to 12 per cent, others 10 per cent. Bureau of Mines investigations have not shown very encouraging results.

Drilling Dune Sands

A paper on drilling Florida dune sands was presented by J. R. Thoenen, Chief of the Mining Branch, Tuscaloosa Division of the Bureau of Mines. Dune sands are extensive and prospect drilling is necessary if one is to determine the content and concentration of heavy minerals. The water table is very near the surface, and the looseness and fluidity of the sand

(Continued on page 144)

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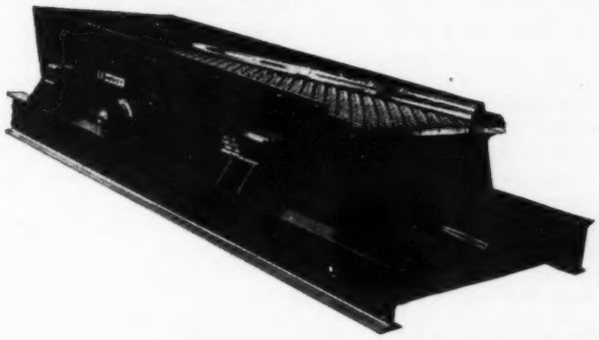

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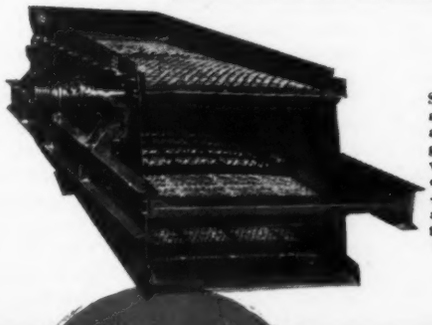

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Southern A.I.M.E. Meeting

(Continued from page 142)

make drilling difficult. Rotary bits were discarded and drive pipes used for sampling. Hammers used for driving weigh 100 to 160 lb. The maximum depth that can be drilled is about 22 ft. The tube is pulled with the sample core at 3-ft. driving intervals. The Bureau of Mines has drilled 243 holes.

The noon luncheon at which Capt. Garland Peyton, State Geologist of Georgia, and J. L. Gillson, Chairman of the Division, presided, was addressed by Dr. Oliver Bowles, a Director of the Institute, representing President Clyde Williams, who could not attend. In his brief address he commended the members on the many successful meetings held by the Division during its 12-year history, and discussed some of the major problems facing the non-metallics field today. He pointed out that the welfare of the producing industries is influenced to a marked degree by development of new uses or by change in use or substitution of one product for another. The Institute, he averred, is performing a useful service by keeping industry informed of important technologic and economic trends.

Feldspar

At the afternoon session, at which Capt. Garland Peyton, State Geologist of Georgia, and Nelson Severinghaus, Supt. of the Consolidated Quarries Corp., presided, six papers were presented. The program was opened by PROF. W. R. BROWN, of the University of Kentucky, who discussed the feldspar deposits of Bedford County, Va. They occur in pegmatites of simple composition ranging in width from 10 ft. to a maximum of 165 ft. The largest one found is over a mile long. The minerals occur in zones. In early years the product was mainly potash spar but with increasing depth soda spar equals or exceeds the potash type. The commercial deposits are in the pegmatites that have escaped hydrothermal alteration.

The non-metallic minerals of South Carolina were described by PROF. BENNETT F. BUIE, of the University of South Carolina. The non-metallic resources of the State are not great, annual value reaching about $7,000,000. The most important from the standpoint of value are the kaolins in the western part of the State. Granites used for monuments, and also as crushed stone, are next in importance. Sand and gravel are produced in several places but very little limestone is quarried. The most unique deposit is topaz in Jefferson County, the only commercial deposit of massive topaz in the United States. Known reserves are about 16,000 tons and possible reserves may exceed 45,000 tons.

To give variety to the program the next paper took the audience far afield to consider the non-metallic mineral industries and deposits in Ethiopia. T. G. MURDOCK, Assistant State Geologist of North Carolina, who spent considerable time in that country under direction of the Federal Economic Administration, presented the data he had assembled. Most of the rocks are of ancient Archaen age, with granite intrusions and some deposits of limestone.

Phosphate, Vermiculite, Shales

T. D. FELTON, of C & J Camp & Butgenbach Co., described methods of prospecting hard rock phosphate deposits. The first step is to look for outcrops of hard rock and to uncover them further by trenching. Post hole diggers may be used for depths up to 10 or 15 ft. For deep holes up to 90 or 100 ft. the casings are driven with 150-lb. weights. At intervals of 2½ ft. the casings are pulled and samples taken for analysis. Jacks are used for pulling casings, but a faster method is now being tried. Fair estimates of reserves are obtained by such drilling.

The uses of that strange mineral vermiculite, which swells to several times its original volume upon heating, were described by J. A. KELLEY, of The Universal Zonolite Corp. Acoustical effects, sound deadening and heat insulation are special fields of application. Its advantages of fire resistance, good color, lack of odor and freedom from vermin were early recognized, and it became popular for home insulation. Later it was used as an aggregate in plaster, for poured-in-place concrete slabs for roofs and floors, and also for precast slabs. A new product is a dry vermiculite plaster, to which water is added before it is applied to surfaces. Another new use is in plant culture for rooting seeds and cuttings. It is also used for underground pipe covering, for packing bottled chemicals, as a filter aid and as a chicken litter.

The last paper on the Atlanta program was a discussion of bloating clays and shales for lightweight aggregate by T. A. KLINEFELTER, Senior Mineral Technologist of the United States Bureau of Mines. Lightweight aggregates have some disadvantages. They are generally low in strength. If they have high absorption they draw away the water from the cement and prevent proper setting. However, they have some decided advantages. Ordinary concrete is a poor heat insulator, but lightweight aggregate gives it good insulating properties. The lighter weight of the concrete is also a great advantage. The question "What makes a clay bloat?" is not yet completely answered. It has been claimed that a carbon content is essential, but some clays high in carbon will not bloat, others with very little carbon will bloat. The first essential is that they must be semi-plastic at temperatures not higher than 1800 or 2000 deg. F. so that gas bubbles can expand. Agents may be added which will reduce the melting point. The second essential is that something must be there to make the gas. Bentonite clays usually bloat well because they contain many impurities. Sulfur in the form of pyrite or gypsum is a bloating agent. The grinding of a shale may improve its bloating properties.

Field Trips

Field trips during October 9 included a visit to the interesting Cartersville, Ga., area where high-grade mineral pigments are mined and prepared for market. The barite deposits of that area were also visited. Another group visited the well-named Lithonia area of Georgia, noted for its extensive granite deposits. The Consolidated Granite Corporation quarries, which are among the most efficient and best-equipped crushed stone operations in the country, were observed under the direction of Nelson Severinghaus, superintendent.

During the forenoon of October 10, one group visited the Ceylon Graphite Mine, Goodwater, Ala. This operation has been more successful than most graphite mines in the United States. A second group visited the quarries and mills of the Alabama Marble Co. at Gantts Quarry, Ala. High grade white and clouded marbles have been produced here for many years. They are fabricated into finished building and monumental products in large, well-equipped mills.

The program at the Tutwiler Hotel, Birmingham, during the afternoon of October 10 related principally to iron ores and petroleum. These subjects are not classed with the non-metallic minerals, but are of great interest to the membership of the Southeast Section of the Institute who were present at this meeting. James T. MacKenzie, chief metallurgist of the American Cast Iron Pipe Co., and J. R. Thoenen, Chief of the Mining Branch, Tuscaloosa Division of the Bureau of Mines, were co-chairmen.

Heavy Media Separation

B. H. CLEMMONS discussed the success attained by separation of impurities from Birmingham hard red iron ores by the heavy media process. When a specific gravity of 3.0 was employed virtually all of the shale and sand grains were removed. With a gravity of 2.9 the shale, but not all of the sand grains were separated. The heavy media process cannot be applied successfully to the soft ores.

R. H. STACEY, of the Bureau of Mines, followed with a description of a field method of determining the heavy mineral content of Florida dune sand samples obtained by test drilling. Determinations were made in the field by a relatively simple volumetric method. Separation was made by means of a heavy liquid of about 2.95 specific gravity. Light minerals such as quartz and clay floated on the liquid. The volume of the heavy minerals that sank to the bottom was read directly in a calibrated tube, and converted to percentage of total minerals

(Continued on page 150)

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NON-METALLICS

By JAMES A. BARR, JR.

Keynote Pacific Coast A.I.M.E. Meeting

PACED by the revealing facts given in the introductory speech of G. L. Fox, Industrial Department, San Francisco Chamber of Commerce, the Pacific Industrial Minerals Conferences got off to a prophetic start.

Amply supplied with romance by the early Western gold and metal mining era, mining engineers and industrialists are looking toward the industrial minerals to bolster up the mining industry and to supply new industries with the non-metallic minerals so essential in our present day non-metal economy.

In San Francisco, (San Francisco Conference) the Non-Metallic Minerals Conference was presented jointly on October 23 by the Industrial Minerals Division and the San Francisco Section, American Institute of Mining and Metallurgical Engineers and the non-metallics section of the Mining Committee, San Francisco Chamber of Commerce.

The excellent sessions were presided over by Chairmen B. C. Austin, chairman, Mining Committee, San Francisco Chamber of Commerce; Lawrence B. Wright, chairman, San Francisco Section, A.I.M.E.; and co-chairmen W. W. Mein, Jr., member, executive committee, San Francisco Section, A.I.M.E., R. E. Tremoureux, chairman, non-metallics section, Mining Committee, San Francisco Chamber of Commerce.

DR. IAN CAMPBELL, Western vice-chairman, Industrial Minerals Division, AIME, as toastmaster and Dr. J. L. Gillson, speaker, during a luncheon meeting predicted phenomenal growth of the industrial minerals and appealed for cooperation between all sections of our country as the best way to realize the greatest mutual benefit offered by such an organization as the AIME.

Future in Non-Metallics

The introductory remarks by G. L. FOX pointed out that the future of the Western minerals industry lies more toward a balance between metals and non-metals and that of the $12,649,000,000 worth of all types of minerals so far produced, greater than 17 per cent of the value has been in non-metallics. In 1940, mineral production in California was valued at $342,000,000 while in 1946 there was an increase of 52 per cent in the industry as a whole. In contrast, the non-metallic mineral production of California in 1940 was valued at $54,000,000 and in 1946, $94,000,000, a significant and prophetic increase of 72 per cent. In 1940 the non-metallic minerals represented 16 per cent of mineral production and increased to 18.2 per cent in 1946. Labor statistics for the 5 counties of the Bay area also show the same trends favoring the producers of non-metallic products. The slate, stone, clay and glass industries have increased 100 per cent.

Steatite Talc

One of the important industrial minerals mined and processed in California is a high purity talc, "steatite." BEN M. PAGE, school of mineral sciences, Stanford University, gave a comprehensive paper, "Some California Talc Deposits of Steatite Grade" in which he discussed the various mines producing steatite and the geological origin of the deposits.

Steatite is employed in insulators which give a low dielectric loss in high frequency and ultra-high frequency radio apparatus. Ceramic bodies used for this purpose contain as much as 90 per cent or more of steatite. Other uses are high altitude aircraft spark plug covers, gas burner tips, insulating cores for electric stoves, high quality paper and cosmetics.

High purity is essential and specifications limit the CaO content to a maximum of 1.5 per cent and the Fe_2O_3 content also to a maximum of 1.5 per cent.

California is outstanding in the production of steatite grade of talc. In 1946 California produced 9600 tons of steatite, Nevada 6000 tons with Montana third in the production of this critical mineral.

The Talc City Mine, located about 6 miles northwest of Darwin, Iuyo County, Calif., has been the major domestic source of steatite and during its activity of more than 25 years has produced between 150,000 and 200,000 tons of talc, nearly all of which was of steatite grade.

The mineral talc, $H_2Mg_3Si_4O_{12}$, is found in many sections of the West. The deposits discussed are thought to be of varied origin. Indications are that the talc was formed by hydrothermal alteration of dolomite, however, some have resulted from hydrothermal alteration of silica rock resembling quartzite, granitic rock, andesite, limestone and phyllite.

Mining methods include "gophering," glory hole, underground caving and the latest successful stoping methods with some necessary variations.

Gravel

To supply the tremendous increased requirements of the heavy construction projects, highways, buildings, homes, irrigation and flood control, the California producers of sand, gravel and crushed rock have had to process 185,000,000 tons of sand, gravel and crushed rock valued at about $122,000,000 during the last five years. LEON D. COLLINS, assistant engineer, Pacific Coast Aggregates, Inc., discussed "Gravel: The occurrence of deposits and relation to industry in California."

Rocks of California were divided into three general groups: granitic basement, the Franciscan series and the Post-Jurassic sedimentary blanket. Geological history of California and the gravel deposits is very complex. River deposits, such as those formed by the many rivers of the Sierra Nevada range have accounted for vast deposits of gravel, some of which have been for many years the primary source of sand and gravel. Development of these unlimited Sierra Nevada foothill deposits was predicted to take place as industrialization takes place in the economical transportation sphere.

Mr. Collins pointed out the Hansen Basin deposits, situated at the end of Big Tujunga Canyon and in the vicinity of Azusa on the San Gabriel river as some of California's largest commercially important gravel sources.

A particularly interesting feature of the Transverse Range occurs in the Ventura Basin, a depository for the South Inez and Santa Monica mountains. One of the thickest sections of Tertiary sedimentary rocks in the world is located here and numerous measurements have indicated depths reaching to almost 50,000 ft.

Fifth in importance in dollar value in the mineral wealth of California, the rock, sand and gravel industry is exceeded only by petroleum, gold, cement, and natural gas. During the past 53 years of recorded production, nearly $475,000,000 worth of miscellaneous stone has been sold. During the past five year period, 1942-1947, production amounted to $122,000,000, 25 per cent of the entire output, 720,000,000 tons, for the last 53 years. In 1946, 41,600,000 tons valued at $27,700,000 were produced in California.

California has been the largest producing state in both tonnage and value for many years, and yearly equals or surpasses the combined production of all other ten of the eleven Western states.

Pumice and Perlite

There was very keen interest shown in a paper "Pumice and Perlite as Industrial Materials in California." C. R. KING, associate metallurgical en-

(Continued on page 148)

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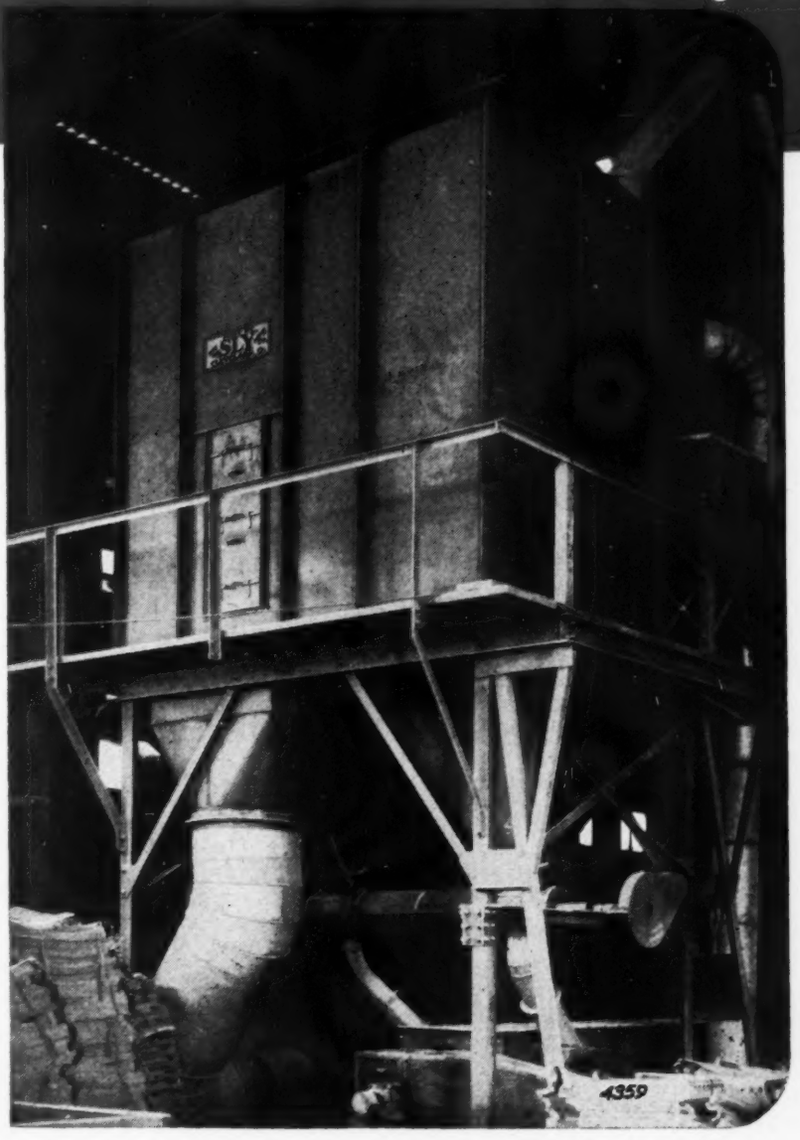

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Pacific A.I.M.E. Meeting

(Continued from page 146)

gineer, California state division of Mines, presented and discussed his outstanding contribution which is probably one of the most comprehensive and informative papers on the subject.

Pumice and perlite are acidic volcanic glasses produced from a granitic magma during explosive volcanic eruption. These acid glasses are essentially complex amorphous silicates of aluminum; with minor amounts of sodium, potassium, calcium, magnesium, iron and other elements. Chemical analyses of pumice, perlite and other acidic obsidians, (natural glasses) will fall within the limits 65 per cent to 75 per cent silica, 9 per cent to 20 per cent alumina, less than 8 per cent combined alkalis, (sodium and potassium oxides), less than 3 per cent calcium and magnesium oxides, less than 3 per cent iron oxide, and will contain minor amounts of manganese, titanium, phosphorous and other oxides.

This paper briefly describes the genesis of, and some types of pumice and perlite; the principal possible industrial uses of these materials and the products derived from them; and the general occurrence of the principal loci of deposits in California with respect to large centers of population and industry in the state. Because of the potential industrial value of the expanded obsidians, (perlite), and the fact that it is a new material in industry; the processing of perlite is described in some detail. Specific information on the use of expanded perlite and of pumice as plaster and concrete aggregates is given. Emphasis is on the industrial use of these materials; hence on their use as aggregates, since these uses represent roughly 90 per cent of the present potential market in California. Tabular data upon chemical and screen analyses, physical properties of some concretes and plasters made with these aggregates, and other pertinent information is included; together with a bibliography.

Pumice is essentially a glass foam formed from odsidian during volcanic explosions, and deposited by wind and/or water action at varying distances from the volcanic vents, in beds of material roughly sorted as to particle size and apparent specific gravity. Expanded perlite (or other varieties of obsidian subject to expansion), is a synthetic or man-made pumice, or glass foam, the vesicular structure of which is formed in a furnace under controlled conditions instead of by blind natural forces in a volcanic eruption as in the case of pumice.

Industrial Uses

Since the time of the Romans, pumice has been used in the abrasive industry for polishing, and in the construction industry as an inert, lightweight aggregate with lime mortar, cement, or other binders, and as an ingredient in puzzolanic cements, where the highly reactive aluminum silicate forms compounds which result in increased resistence to penetration and corrosion by fresh or sea water, and long continued age hardening of the concrete.

The extensive use of pumice in industry, (other than the abrasive industry), dates from about 1925, (in California and the United States). In 1926, the California production of pumice and pumicite was 7170 tons valued at the quarries at $48,350, and the production was almost entirely used in the abrasive industry. After 1926 the production and value increased yearly, until in 1946 the California production of pumice and pumicite was 109,191 tons, valued at $540,-811 at the quarries. Over 90 per cent of this was used in the building industry as an aggregate, and production is still increasing.

First attempts to make and use expanded perlite in the United States date from about 1940, although this material was made and used in Germany prior to 1925.

There are many technical difficulties to be solved by producers of perlite before types of materials and specifications can be stabilized.

Uses and possible uses for pumice, pumicite and expanded perlite were discussed: (1) abrasives, (2) aggregates and fillers, (3) insulating media and, (4) miscellaneous uses such as filter aids, absorbent materials, catalyst carriers, fillers in paints and enamel, paper filler, insecticide carriers, extenders in the rubber and plastics industries as well as many others.

Mr. King indicated that the prevailing price for pumice aggregate in the Los Angeles area is from $3.20 to $4.00 per yard, in quantity purchases. A good grade of crude perlite can be purchased, in quantity, for about $9.00 per ton at Los Angeles. Cost of expanding not included.

Processing of Perlite

Certain types of obsidian, notably the perlitic variety, will expand up to 20 times volumetrically upon sudden exposure to heat within a range of about 1400 deg. F. and 2500 deg. F.

Obsidian containing evenly distributed dissolved or chemically combined water and possibly other gases is crushed, usually screen sized, and heated in a suitable furnace at a suitable rate of heating to that critical temperature at which the expanding gases acting against the pasty heat-softened glass will form bubbles within the mass of the glass particles, causing them to expand. At this point the material is ejected from the furnace and cooled rapidly before the expanding gas bubbles have had time to escape from the mass of the glass. Some of the variables involved in this process are:

(1) Variation in the raw material: Perlite is a rock, not a mineral; hence variable in chemical composition within quite a wide range and composition will vary as between different deposits and even within the same deposit.

One of the most important variables in the raw perlite is the amount and type of contained water or other gas. The expanding agent in some of these cases may be gases other than water vapor, but not necessarily so, since even 0.1 per cent of combined water is theoretically ample to give several hundred per cent volumetric expansion at above 2000 F.

(2) Control of physical properties of expanded perlite: To date, there are no generally accepted standards and specifications by which the suitability of a given processed perlite for a specific use may be judged.

(a) Apparent specific gravity of the material: Should be less than 1. For practical purposes, over 90 per cent of the expanded perlite should float on water.

(b) Bulk density: Is a rough measure of the crushing strength of expanded perlite. It may be obtained by slowly pouring the material into a cubic foot box until the box is overflowing, then striking off the top level, and weighing the contents.

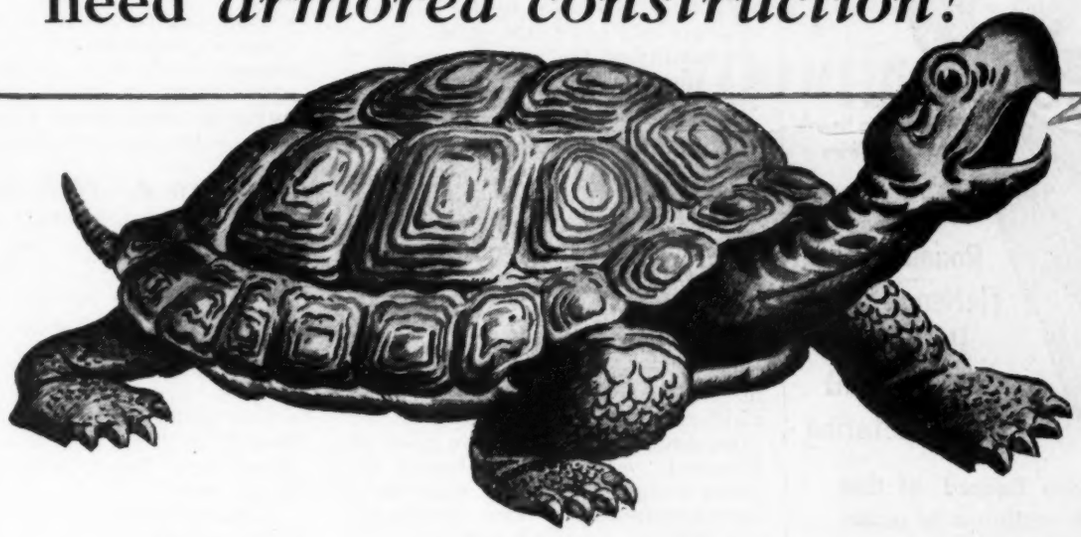
(c) Porosity: Expanded perlite will range from a frosty appearing, highly porous material to an aggregate of glazed particles having almost no porosity.

(d) Size range: The ideal size grading of a perlite aggregate or filler will depend on the specific mix and binder used, as well as the properties sought in the finished wall or unit. Sizing should be done on the raw material before expanding, and not on the expanded product.

Great differences of opinion exist upon the subject of size grading when using the lightweight mineral aggregates. In the case of perlite, when used for interior plaster aggregate; where lightweight, excellent insulation properties and good acoustic properties are more important than low porosity; a grading of approximately all through 8 mesh, with not more than 5 per cent to 10 per cent through 100 mesh, and the intermediate sizes bunched in the range from 30 to 60 mesh; has been used successfully. For exterior stucco and prefabricated masonry concrete, a grading of all through 4 mesh, with 10 per cent to 15 per cent through 100 mesh, and the intermediate sizes approximately equal in distribution; has been used in concretes of adequate crushing strength and reasonably low water absorption, (1000 to 2000-28 day p.s.i., 6 to 12 lbs. water absorbed per cu. ft. concrete, weight finished concrete air dried 40 to 70 lbs. per cu. ft.). There is some evidence that lower moisture absorption, higher crushing strength, greater age hardening, and higher resistence to corrosion in concrete is attained by the use of a rather large percentage of fines, (—100 mesh) in mixes, or by the addition of 5 per cent

(Continued on page 150)

Blocks and sheaves, too, need *armored construction!*



IF you have to take a beating, it pays to be tough! And blocks and sheaves *do* take a beating. Slammed against steelwork, battered by sudden drops, exposed to the elements, dragged through sand and mud, they're either tough—or else!

That explains why so many of the biggest wire rope users specify "AMERICAN HOIST" on every order for blocks and sheaves. For we give you *armored construction.* That means extra thick side plates and reinforcing straps—oversize pins and axles—hooks and shackles of tough forged steel.

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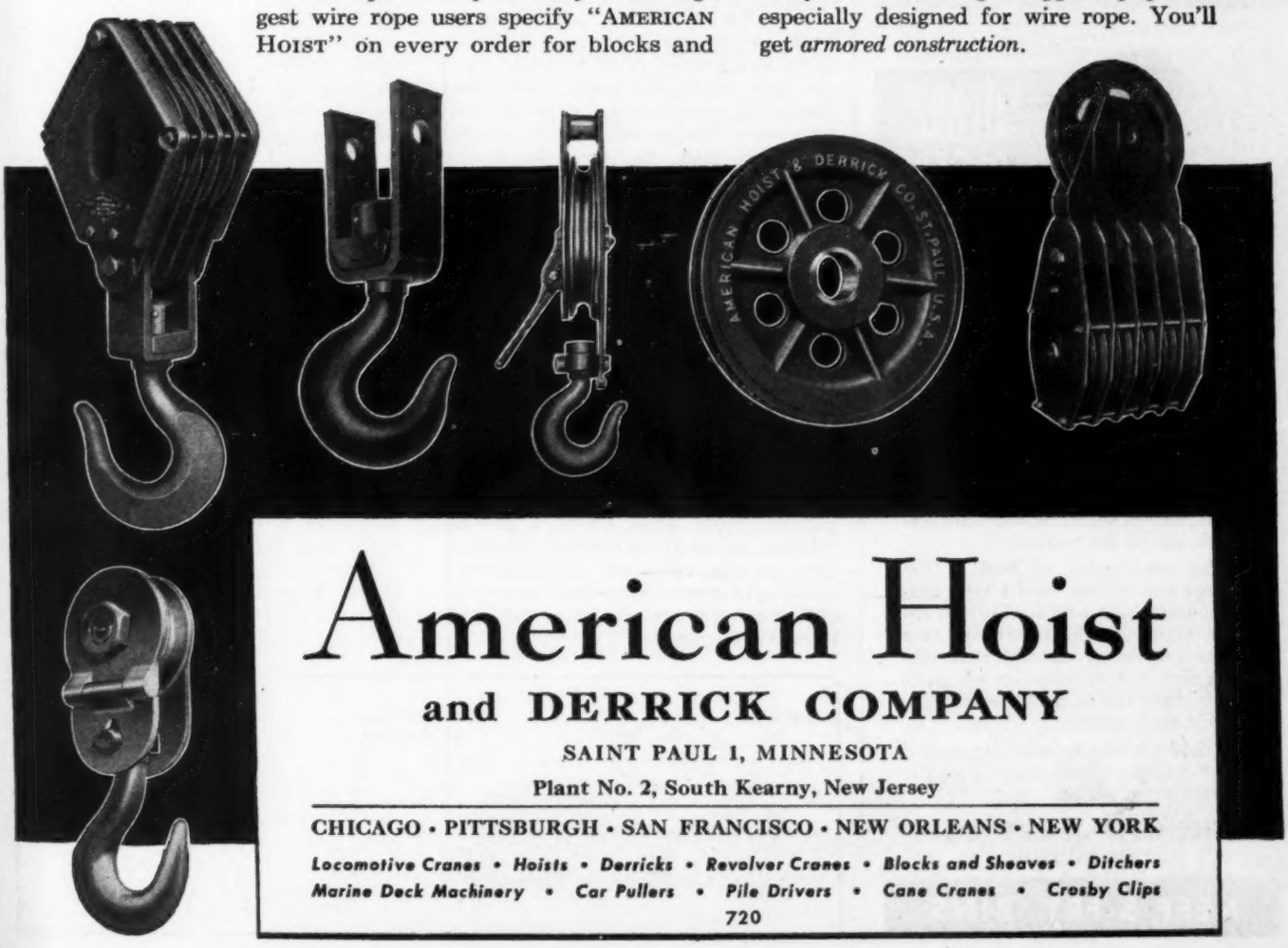

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NEFF & FRY BINS

(Continued from page 148)

to 15 per cent of pumicite or diatomite to the mix where the perlite is deficient in the fine sizes. It is probable that small particle size expanded perlite will act as a puzzolan as well as a filler ingredient in the mix, and thus not only add to the plasticity and workability of the mix, but result in a stronger and more impervious concrete.

Perlite Furnace Types

Many types of retorts or furnaces have been designed to "pop" perlite. Types now used were discussed: (1) horizontal or inclined stationary furnace, (2) horizontal (or inclined) rotary types, and (3) vertical type furnaces.

The foregoing represents the major types of expanding furnaces in commercial or pilot plant operation in California. Many other methods of expanding perlite have been tried or proposed; varying from heated inclined troughs to various electrically heated mechanisms. One interesting and perhaps practical method is the application of high frequency induction heating to the expansion of obsidian (including perlite). This "diathermic" method literally heats the particles of rock from the inside out, and produces perfect three dimensional expansion and a product of very high strength-weight ratio.

The present selling price in California for processed perlite varies from 15¢ to over 50¢ per cu. ft. There is no established price structure, and to date most purchases have been made for experimental or small volume uses. The largest volume of sales has been made as hardwall plaster aggregate in the San Francisco Bay region, and as aggregate for precast masonry building units, in the Los Angeles area, with plaster aggregate a close second. Present prevailing price for plaster aggregate in the San Francisco area is about 35¢ per cu. ft. In the Los Angeles area perlite plaster aggregate has sold recently for from 25¢ to 35¢ per cu. ft., and concrete aggregate for from 15¢ to 40¢ per cu. ft.

Comparative characteristics of a good pumice aggregate as used in the Los Angeles area, (Cosco district pumice, from Anyo County) are as follows, as used in typical concretes for various types of construction: (sand and gravel aggregate concretes of the same types are given for comparative purposes):

Comp. p.s.i. wanted	Unit weight lbs./cu. ft.		Cement ratio sacks/yard		"k" Factor B.T.U./sq. ft./in °F/hr.	
	Pumice	Rock	Pumice	Rock	Pumice	Rock
3500	110	155	7.5	6.5	2.25	13.00
3000	102	152	7.0	6.0	2.20	12.50
2500	90	150	6.5	5.5	2.15	12.00
2000	87	148	6.0	5.0	2.00	11.50
1500	75	145	5.0	4.0	1.95	11.00
1000	66	142	4.5	3.5	1.85	10.50

The puzzolanic or age hardening effect of certain pumices and pumicites has been very briefly mentioned. Where puzzolanic concretes are wanted, the direct replacement of part of the cement used in the mix with some types of pumice fines (—200 mesh) or pumicite results in a marked increase in compressive strength of the concrete with time, as well as less permeability to water, and greater corrosion resistance to sea water, fresh water, and organic acids.

Southern A.I.M.E. Meeting

(Continued from page 144)

present in the sample. The results of these field tests checked closely with the more precise results obtained in the laboratory. Among the heavy minerals are chromite, kyanite, sillimanite, magnetite, garnet and titanite. The heavy mineral content is usually rather low ranging downward from 5 or 6 per cent by weight to almost zero. Rarely is it more than 10 per cent.

ANDREW BROWN, also of the Bureau of Mines, presented the results of Bureau work in developing new methods of drilling brown ores that would give better results than are obtained by the churn drill. A power auger proved unsuitable, but a rotary core drill, after much experimentation gave excellent results. Technical information on drilling was supplemented with data on costs with government-owned drills compared with those obtained when contract drilling was followed. Core drilling is slower than churn drilling but is more informative. Detailed results will appear in a Report of Investigations of the Bureau.

MILTON H. FIES, a Director of the Institute, presided at the informal dinner on the evening of October 10.

On Saturday forenoon, October 11, a group visited Tennessee Coal Iron and Railroad Co. limestone mine near Bessemer, Ala. This mine illustrates remarkably well the great advantage the Birmingham region has by virtue of the close proximity of flux and ore. The mine is an inclined shaft about 2500 ft. long, the limestone being mined at a vertical depth of about 700 ft. A bed with a maximum thickness of 28 ft. is excavated. The limestone underlies iron ore which is mined at a higher level, both limestone and ore being brought to the surface through the same inclined shaft. A crushing plant is operated near the shaft entrance. Chert impurities are removed from a picking belt.

Labor Relations

(Continued from page 93)

the case of the employer, is under obligation to reduce the agreement to writing and sign it upon request when the major points of the agreement have been reached. In my opinion the recognition and adherence to the provisions of this agreement for collective bargaining in good faith by both employer and the representative of the employes marks the outstanding feature of the Act that can be made the medium for a greater degree of industrial peace than any of the other provisions of Section 8.

* * *

"The secondary boycott, the refusal to handle 'hot' goods, the secondary strike for recognition, and the strike for disputed jurisdiction, have been trade union techniques since long before the Wagner Act, but now they have been tagged by Congress as against the public interest and ordered stopped. My advice to all labor organizations is to heed this mandate and go about the promotion of the welfare of their members in a way that will promote, not destroy, industrial peace and advance the productive value of the nation's manpower that is represented in their memberships. Strikes sometimes have been necessary in the past when only its economic force was available to labor, but today the really necessary or justified strike is almost as rare as the extinct Dodo, when all the machinery that has been set up for the settlement of real industrial disputes is considered. The trouble is that those things the Act has outlawed are not true labor disputes. That is why they are outlawed."

CYRUS S. CHING, head of the new Mediation and Conciliation Service, now independent of the U. S. Department of Labor, has reported that strikes handled by federal mediators had reached a record low of 94 after the first two months of his program to prevent industrial disputes. These strikes involved 25,950 workers. Two years ago the War Labor Board had on its hands more than 3000 disputes, and less than 20 months ago the Labor Department was trying to settle 350 strikes involving 1,500,000 employes.

Mr. Ching's staff is studying more than 200,000 labor-management contracts in connection with the Taft-Hartley Act's provision requiring employers and unions to give the federal government 30 days' notice on contract expirations. Such notices were coming in at the rate of more than 200 weekly, as of the first week in November.

Purchase Lime Works

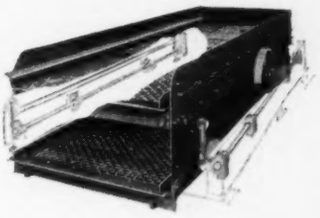
STE. GENEVIEVE LIME WORKS and Peerless Lime Co., Ste. Genevieve, Mo., and Glencoe Lime Works, Jefferson County, Mo., have been purchased by the Mississippi Lime Co. at a cost of $1,100,000.

Here's Why Profit-Minded Operators Everywhere Choose SECO Vibrating Screens

There's a right SECO for your needs

More Tons Per Hour

1. Results count! Yes, day after day performance records piled up by Seco screens over the last eight years on all types of installations prove conclusively their ability to screen more tons per hour. Here's how.



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2. This basic engineering advantage makes the difference! Seco and only Seco has a fully controlled true circular action—that never varies—operates with less maintenance, keeps every inch of screen surface working at all times.

No Bobbing • Galloping or Weaving

3. There's no lost motion—no slowing up of the load—blinding is kept to a minimum—and just think how much longer a Seco screen will hold up on the job with less maintenance—because there's no excess strain on any one part. Get more production per hour—per month—per year. Get a SECO!

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DOUBLE DECK

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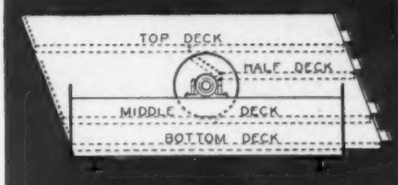

THREE AND ONE HALF DECK

To scalp a small amount of oversize and make 3 finished sizes as well as fines.

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Lone Star in Cuba

(Continued from page 133)

ued aid and assistance in the preparation of this article.

Lone Star Plant—Cuba

At Cayo Mason Province of Pinar Del Rio, Cuba, is located the Lone Star Cement Corporation subsidiary, Cuba Portland Cement Corporation. It is about 80 kilometers west of Havana on the Marial Bay which is navigable.

Five kilns are being operated, each 177-ft. long. The last kiln recently installed is 10- x 177-ft. The total capacity of the plant is 5000 bbl. per day. Short kilns are used in order to operate waste heat boilers and produce sufficient power to operate the plant.

Oil for burning clinker requires about 1,800,000 B.t.u. though a portion of this must be charged to power production. Fuel oil costs $2.50 per bbl. Unskilled labor rate is 65¢ per hour and skilled labor, such as kiln burners, etc., is up to $50 per week. Time-and-a-half is paid for all work over 40 hours.

The mix is the usual high grade coral limestone. Two 3-cu. yd. shovels are used in the quarry with locomotive haulage of quarry cars to the crusher. The usual limestone-clay mix is used with slurry containing about 40 per cent water.

Power per barrel is low, about 13 kw. hr., but the cement is ground to a very low surface area and only Type I cement is made.

At present two Dixie hammer mills, operated by 100-hp. motors, are being installed, each to be used as preliminary break down mills for the raw mill.

A fine, well-equipped storeroom has been completed along-side a new, very fine shop. The shop is equipped with a 7½-ton overhead crane, a heavy duty lathe, milling machine, planer, shaper, and hydraulic press.

Fine Employe Facilities

The combined service and locker room is one of the finest I have ever seen. Walls of the locker room are white glazed tile, and the room is a concrete structure, well-lighted and ventilated, supplied with Bradley wash basins, shower baths, and toilets. Lockers are of light hard wood with a wire screen in the door for ventilation.

Adjoining this room is a large, roofed-over recreation room open on three sides. It has a smooth tiled floor, large enough for dances for over 200 couples. There is provided a stage for theatrical performances and a screen for movies. A cafeteria serves light meals and soft drinks.

The plant is under the direction of L. Scott Thompson, vice-president and manager, and is operated by W. Forster, vice-president and general superintendent, and R. A. Sanchez, superintendent, who arranged for my visit through the plant. The capacity is 5000 bbl. of Type I cement per day.

Chemist Corner

(Continued from page 134)

industry could bring to light. Some of these follow:

1. What constitutes a good pozzolana?
2. What is pozzolanic activity? How does it react with cement? What method can be adopted for measuring pozzolanic activity?
3. Why are some good pozzolanas not capable of eliminating the effects of the alkali-aggregate reaction? What properties are necessary in a pozzolana to accomplish this purpose?
4. What would constitute a suitable all purpose pozzolana that could be manufactured in any cement plant?

It is certain that there are a great many more things that we should know than have been listed, however, those listed are quite broad and considerable study would be involved in answering any one of them, in the present state of our knowledge.

It is possible that question No. 4 should be the ultimate aim of an investigation by the industry, because if this were established anyone in the industry could manufacture a suitable pozzolana and the probabilities are, that the product would be as uniform, the country over, as are any of the present types of portland cements. This would be advantageous not only from a marketing standpoint, but also from the standpoint of making a complete study of the same, since one relatively narrow range of composition would be involved.

The good natural pozzolanas should also be studied, which study could be used as the starting point for the entire investigation, since these materials have the properties desired.

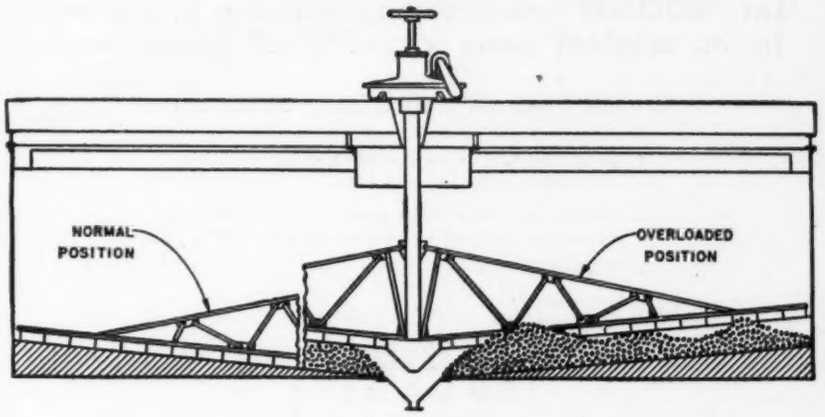
Reports from various sources have indicated conflicting opinions regarding the ability of portland-pozzolan cements to withstand freezing and thawing conditions. Of course, straight portland cements did not do so well either in this respect until the beneficial influence of air-entrainment was discovered. Portland-pozzolan cements should also be given the benefit of air-entrainment in localities where freezing and thawing conditions prevail.

Note: Some who read this article may obtain the impression that the writer is not of the portland cement industry, but this is not the case. He is of the industry and has the interest of the industry very much at heart. He is concerned chiefly with having the industry turn out the very highest quality products at all times, and feels that industry has done themselves no favor by not recognizing the potentialities of pozzolanas and doing something about developing them.

Building Rock Wool Plant

TEX-ARK ROCK WOOL CORP. is building a plant for rock wool production at Texarkana, Arkansas. The new plant will expand Arkansas marl into rock wool insulation.

SCRAPER BREAKAGE IS *Out of Style*



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The ingenious Hardinge "Auto-Raise" Thickener drive mechanism automatically lifts the entire scraping assembly upward when an overload of pulp occurs anywhere in the tank bottom.

Restarting, after an unexpected shut-down due to power failure, will not result in scraper breakage when "Auto-Raise" is at work.

Another feature of the Hardinge Thickener is its double-spiral scraper, which removes settled solids rapidly — prevents "pile-ups".

Write for Bulletin 31-D which describes this unusual thickener in detail.

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Lime—Automatic Controls

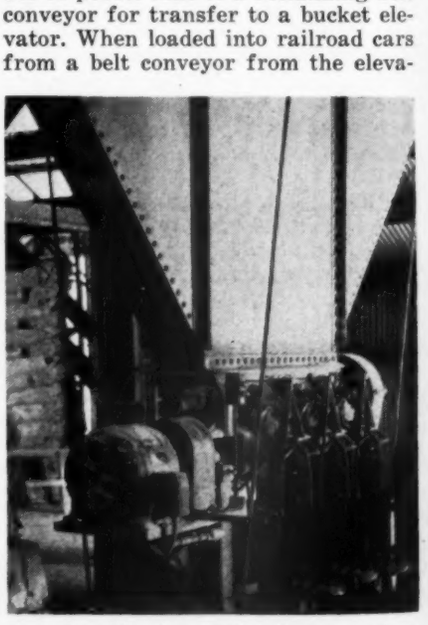
(Continued from page 141)

to maintain the desired excess air.

The tempering air damper for the primary air fan is regulated by the temperature recorder controller to hold the temperature of the coal-air mixture constant when leaving the pulverizer. Induced draft dampers are adjusted by the draft controller to maintain a steady hood draft. It is desired not to exceed a temperature of 700 deg. F. for the exit gases as they enter the induced draft fans in order to protect the fans. Temperatures as indicated by thermocouples at the 100 and 200 ft. points inside the kilns will serve as indicators of quality of lime as measured by the presence of core.

Lime from each of the coolers drops into a surge hopper for elevation to sizing screens over five 30-ft. diameter 950-ton Neff & Fry concrete silos arranged in a row to accommodate a reclaiming belt conveyor below. The lime from each cooler is elevated by an automatic Beaumont Birch single drum hoist pulling a 60-cu. ft. skip bucket. As the cooler discharge hopper is filled, a floating gate swings to push an electric switch which starts the skip bucket down from on top the silos. The skip trips the hopper and lime flows into the bucket which pauses 10 seconds and then is automatically raised to the top of the silos.

The skip discharges into a stone bin and is fed into the first silo, surge storage, by an 18- x 42-in. Syntron feeder or on to a belt conveyor to the first of two sizing screens. Two 4- x 10-ft. Hum-mer screens, one double-deck and one single-deck, with belt conveyors between, size the lime into 2½- x 1¼-in. size, 1¼- x ⅝-in. and ⅝- x ⅛-in. which are dropped into separate silos. The fifth silo is for screenings. Two hydraulic reciprocating feeders below regulate the flow out of pebble lime to a reclaiming belt conveyor for transfer to a bucket elevator. When loaded into railroad cars from a belt conveyor from the eleva-



One of packing bins. Note catenary construction of overhead bin

tor head, the lime is passed over a 4- x 10-ft. single-deck Hum-mer screen to reject minus ⅛-in. fines. The same elevator transfers quicklime to a belt conveyor to a 200-ton hydrate feed bin in a separate building.

Hydration

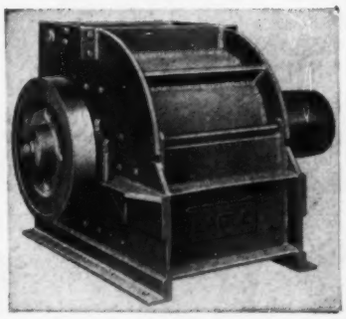
Hydrated lime is produced for agriculture, spray purposes and for the general chemical industries at the rate of 12 t.p.h. Quicklime is drawn from bin storage by screw conveyor and elevated into a six-ton surge bin over the hydrator, which is a Schaffer continuous hydrator 9 ft. 7 in. in diameter and 17 ft. 8¾ in. in height. Feed into the hydrator mixer intake is regulated automatically by a Hardinge Feedometer which also records the tonnage fed per hour. The hydrator feed tank has Bin-dicators, high and low, to start and stop automatically the conveyor and elevator filling the bin. Water is added in the hydrator stack through a spray from a needle valve impinging on a cone. A solenoid valve will be hooked to the lime feeder drive to start and cut off the water supply. A Brown recording thermometer and an ammeter on the motor drive are devices yet to be installed on the hydrator. Hydrator temperature will be an indicator of quality and completeness of hydration and the hydrator will be operated at the "best temperature," as recorded. If the consistency of the lime within the hydrator is either too dry or too wet, the condition will reflect on the motor load and the recording thermometer.

Hydrate is conveyed by screw conveyor from the hydrator to a bucket elevator and placed by screw conveyor into either of three mill feed bins, two of which serve Raymond No. 3 automatic pulverizers and the third a Raymond four-roll high side mill. The pulverizers throw out overburned lime and core at the bottom of the mill and the fines, as classified by the whizzers, are carried up to a cyclone collector which vents to a tubular-type dust collector. Both discharge into a hydrate bin of 200 tons capacity and the product is packed by two St. Regis packing machines of 6 t.p.h. capacity each. Spillage at the packing machines is carried by screw conveyor to the hy-

(Continued on page 156)

Vibrating feeder to regulate flow of quicklime on to belt for screening

That's where you see the results—and results can win or lose a contract. How uniform?—What capacity?—What range of adjustments?—Upkeep?—How rugged?—Availability of parts? These are questions we invite you to study when you select a crusher. In the aggregate—in another sense—the reasons *will* add up and you'll decide that *Eagle is the buy!*



Impact Breaker and Pulverizer
Model 12-24

•

CRUSHERS AND PULVERIZERS
in a range of sizes

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TRUCK-MOUNTED LOADERS

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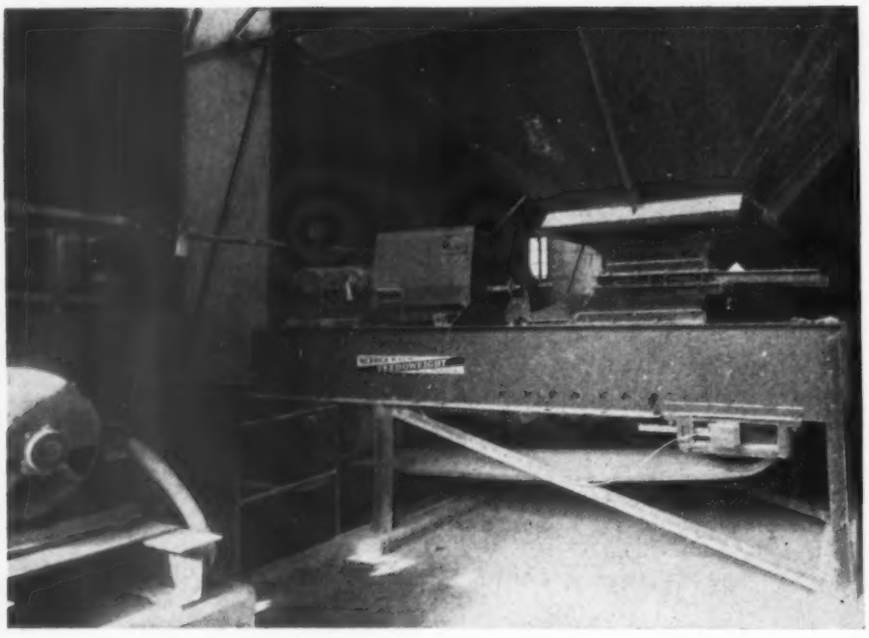
Send for Detailed Catalogs
Describe Your Needs

EAGLE
JAW CRUSHERS • IMPACT BREAKERS
PULVERIZERS • CONVEYORS • LOADERS
CRUSHER CO., Inc. GALION OHIO·U·S·A

Merrick Feedoweights Control Kiln Feed at New National Gypsum Lime Plant



Feedoweights control the flow of raw materials to the two rotary kilns at the new National Gypsum Lime plant in Kimballton, Virginia. Their accurate feed control has reduced coring, underburning and other imperfections of product to a minimum and have assured uniformity of quality never before possible.

Feedoweights are used throughout the non metallic minerals industry wherever accurate proportioning of loose materials is essential. The Feedoweight accurately, automatically and continuously controls the rate of feed by weight and accurately records the weight of materials fed.

Send us an outline of your requirements and let us give you a plan for accurately weighing, recording or proportioning material by weight in your plant with Merrick equipment.

MERRICK SCALE MFG. CO. 188 AUTUMN STREET PASSAIC, NEW JERSEY

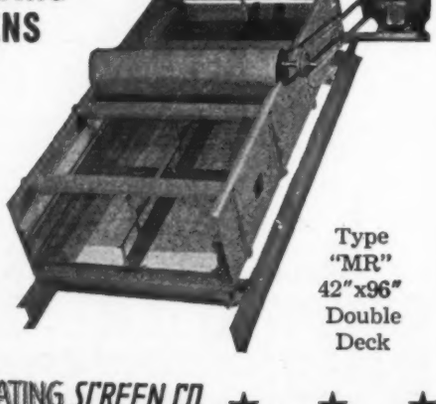
UNIVERSAL VIBRATING SCREENS

give best results

Hundreds of operators know the all-around efficiency and economy of the UNIVERSAL and profit by it! It will pay *you* to investigate this pioneer Vibrating Screen before *you* buy.

There's a UNIVERSAL to fit your particular requirements.

Write for Catalog No. 107 on Screens and Screening.



Type "MR" 42"x96" Double Deck

★ ★ ★ UNIVERSAL VIBRATING SCREEN CO. RACINE ~ ~ WISCONSIN ★ ★ ★

Lime—Automatic Controls

(Continued from page 155)

drate elevator and returned into the mill feed tanks. Chemical, industrial and spray hydrate are pulverized through these two mills. Similarly, agricultural hydrate is pulverized through the 4-roll high side mill and packed by two similar packing machines from a 200-ton bin. Rejects from all the mills are conveyed by screw conveyor to a bucket elevator and then into a surge bin or a tailings bin. They may be returned into the agricultural hydrate mill by screw conveyor into which a Syntron feeder regulates the rate of feed.

Hydrate is fed into the mills by gravity through a pneumatically controlled feeder and a fan forces air through each mill to lift the product to the cyclone, the whizzer on each mill being adjusted to control the fineness of product. Excess air from the cyclone collector, in each case, is circulated back to the fan and into the mill.

Flour Plant

All minus ⅜-in. stone is converted into pulverized limestone in a separate building adjoining the screening plant. Stone is conveyed into this plant by belt conveyor from the screening plant for transfer by screw conveyor into either of two 250-ton mill feed bins of catenary steel construction; or is trucked to a hopper from which a bucket elevator transfers the stone to the same screw conveyor. Excess stone is diverted to yard storage.

The stone is pulverized through two Raymond four-roll high side mills with double whizzers. Heated air from a Todd rotary fuel oil burner is introduced into the mills through the return air housing in a system that operates under suction. A thermocouple is to be installed at the outlet of the separator as a means to maintain a uniform atmosphere of 180 deg. F. within the mills.

The product is collected into an overhead cyclone, for each mill, and conveyed by reversible screw conveyor into either of two 250-ton capacity catenary steel bins. Capacity of the grinding mills is 5 t.p.h. each and each of two 3-spout St. Regis packing machines will pack 10 t.p.h.

Electrical Power

A double-loop electrical circuit brings power into the plant substation for transformation to 2300 volt and 440 volt electrical potential, and recording watt-hour meters automatically record the consumption in each operating department. Power factor is also indicated and recorded for both the 2300 volt and 440 volt circuits. Some drives in excess of 200-hp. rating are synchronous motors, to control the power factor. The substation is equipped with G. E. switchgear throughout and is a positive check on consumption of power for each de-

partment for comparison with billing and as a guide to the correction of wasteful use of electrical power.

Kimballton being remote from any large cities, the plant has been equipped for self-sufficiency. A well-equipped machine shop and first aid station have been provided. A coal crushing plant was built alongside the firing end of the kiln building, consisting of a Pennsylvania coal crusher under a track hopper and 200-ton Neff and Fry silo from which minus ¾-in. coal is drawn for elevation and transfer by belt conveyor into two 50-ton coal mill feed bins. Normally, coal is handled directly into these bins by elevator from the track hopper and the belt conveyor.

As a check on quality and, as a guide to the kiln burners, a laboratory has been established at the plant and tests of samples are conducted on regular schedule. Among the tests run are availability tests of quicklime and hydrate, screen analyses, ignition loss tests and complete chemical analyses to determine the percentages of silica, iron, alumina, magnesia, phosphorous and sulfur content.

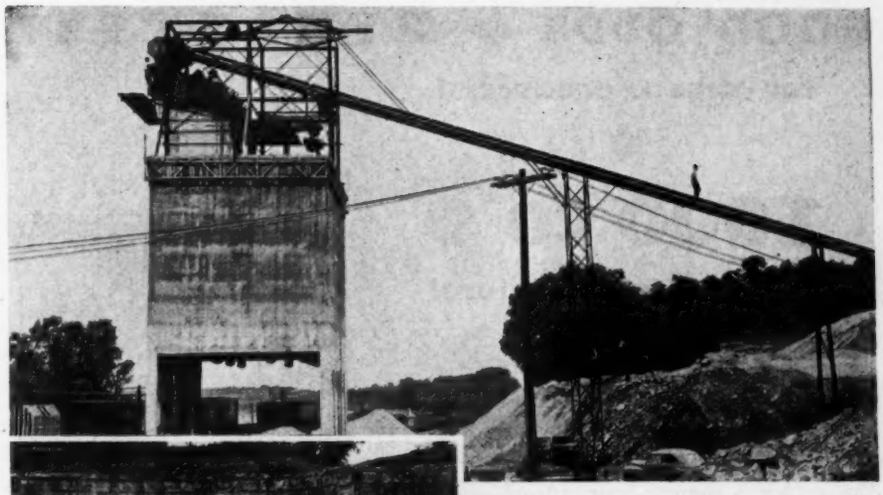
Samples are taken from each kiln every one-half hour and composites from these samples are tested for an analysis for each 8-hr. shift of each kiln. The kiln operator checks visually for core in the samples and the laboratory results are posted for his benefit. Available CaO, ignition loss and slaking residue tests are made each day from six samples.

All cars of lime are sampled and the above tests are run and recorded for each. Periodic complete chemical analyses are made from car samples and, on occasion, special analyses are run for phosphorous content or the presence of other of the constituents.

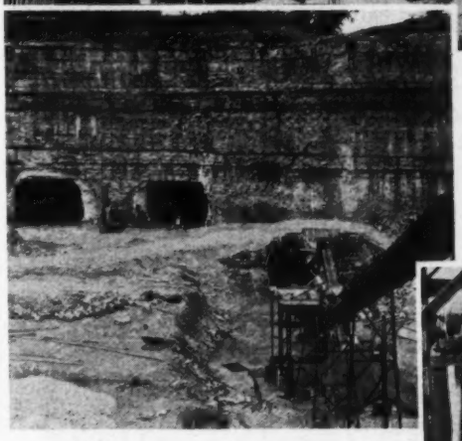
Bayard Magee, who previously had operated National's high calcium lime plant at Bellefonte, Penn., supervised construction at Kimballton and has remained as works manager. R. E. Gill, from the Luckey, Ohio, and Bellefonte, Penn., plants, is plant superintendent; Nils Eilertson is mine superintendent; and Monroe Rule is in charge of engineering and maintenance. The plant is under the general supervision of F. A. Manske, production manager, with offices in Buffalo, N. Y. Geo. A. Fuller Co., Baltimore, Md., was general contractor for construction of the plant.

20 Year Awards

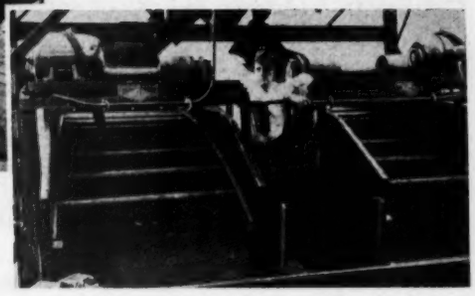
NATIONAL GYPSUM CO., Buffalo, N. Y., recently presented 37 wristwatches to employes in recognition of their 20 years' association with the company. President M. H. Baker made the presentation of watches at both the home office and the Clarence Center, N. Y., plant. G. H. Tarbell, vice-president in charge of production and himself a recipient of a watch, and John Burns, production manager for gypsum, presented the watches to employes at the National City, Mich., plant.



Top: The new Loring Quarries storage bins, with Plat-Os on top, erected over a siding of the Union Pacific railroad.



Left: For winter operations, Loring Quarries opened two tunnels into the face of their quarry.



Right: Standing between the two Plat-Os he helped install is Frank Galliher, sales engineer, English Brothers Machinery Company, Kansas City agent for the Deister Machine Company.

Equipped for

YEAR-ROUND OPERATION

PLAT-O by DEISTER

When Loring Quarries, Inc., installed a new and larger plant at their Bonner Springs, Kansas, quarry, Plat-O Vibrating Screens were chosen for the final screening job. Three important reasons for selecting Plat-Os were:

1. Their proved all-weather performance.
2. Their capacity for handling heavy loads continuously.
3. The engineering service provided by agents of the Deister Machine Company.

Investing in two 4'x12' triple-deck Plat-O Vibrating Screens, the Loring Quarries, Inc., mounted these 15 feet above the storage bins and 75 feet above the ground. Each Plat-O produces 100 tons per hour of agricultural limestone and road rock. An inclined conveyor system, 225 feet in length, brings the crushed stone to the Plat-Os.

These rugged Plat-O Vibrating Screens can be engineered to your needs. For recommendations, write the Deister Machine Company, Fort Wayne 4, Indiana.

DEISTER MACHINE COMPANY
FORT WAYNE 4, INDIANA

GOOD ODDS → PYRASTEEL

for cement producers!

1000 to 0

against service failure!

Kiln Ends

Showing discharge end of cement kiln fitted with PYRASTEEL Segmental Kiln Ends.

Unit Segments stall or replace. are easy to in-

One thousand PYRASTEEL Kiln Ends have been installed in cement kilns over a period of 14 years, without *one* recorded failure!

This evidence, coming from customers, is proof that PYRASTEEL Kiln Ends are a good investment in maintenance economy. Their use avoids costly burnouts and production delays.

PYRASTEEL is recommended for continuous, economical service in other high-temperature applications, such as making conveyor screws, drag chains, feed pipes and clinker coolers.

Write for PYRASTEEL Bulletin

CHICAGO STEEL FOUNDRY COMPANY

PYRASTEEL for high temperatures

KEDZIE AVE & 37TH ST
CHICAGO 32, ILL.
Makers of Alloy Steel for 35 Years

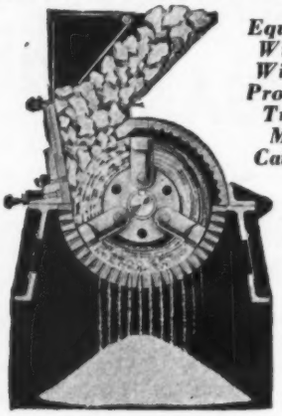
EVANSTEEL for strength

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 62 YEARS

GRUENDLER'S MOST VERSATILE CRUSHER and PULVERIZER

TWO-IN-ONE HAMMERMILL

The Adjustable Feature of a Gruendler Two-In-One gives you either a cubular crushed rock (no slivers or finger stones) for road or construction work —or will produce a uniformly crushed limestone ideal for mixes and topping or for Agricultural purposes.



Equipped With or Without Protective Tramp Metal Catchers

Cut-a-way view of Gruendler Pulverizer

Built in a size range from 3 tons per hour to 75 and 100 tons per hour. Larger sizes for primary and secondary work.

WRITE FOR ILLUSTRATED BULLETINS

IN STOCK FOR IMMEDIATE SHIPMENT

2X Hammermills up to 15 tons per hr.
3X Hammermills up to 30 tons per hr.
4X Hammermills 50 to 150 tons per hr.
6X Heavy Duty Hammermills 200 to 500 tons per hr.
10x16 - 24x36 Jaw Crushers.
40x24 Double Roll Crusher—Smooth or Step Tooth.
FEEDERS — CONVEYORS — BUCKET ELEVATORS

GRUENDLER

CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

Dust Collection

(Continued from page 125)

bag is necessary, it can be easily done. The bags are enclosed in a steel, weather-proof housing with the assembly easy to install out of doors. The filter bags are suspended from the top and are hooked up to a motor and gear drive for the shaking mechanism. The company also manufactures a complete line of cyclonic type collectors.

Rock drilling has received its share of attention as regards dust elimination.

THE KADCO CORPORATION, New York, N. Y., has a relatively simple equipment design for the removal of dust hazards from rock drilling operations. Besides protecting the operators from the possible dangers of silicosis, impressive savings are said to be possible due to faster drilling rates secured when the Kadco is used. The immediate removal from the drill hole of dust and cuttings results in faster drilling, and also, due to the absence of grinding and abrasive action around the drill point, less frequent drill steel sharpening is necessary. It was also pointed out that the use of wet drills is not very satisfactory in cold weather due to freezing. The popular sized units are very mobile and include dust storage facilities of capacities to fit the needs. The illustration shows the essential points of the process.

Metakloth Co., Lodi, N. J., has a process called Thoratex whereby cotton fabrics for dry or wet filtration are chemically impregnated so as to be more resistant to alkaline conditions. The treatment reduces possibilities of shrinkage and resists mildew.

The big problem, briefly mentioned under the Dust Collection heading in this issue, is the elimination of dust in packing operations. This is all part of the packing problem. An example of one of the most efficient packing plants is the Universal Atlas installation at its new Northampton, Penn., plant. Here every provision has been made to make the packing operation efficient and free from dust. The ideal toward which the industry is moving is to have a packing system in which the bags will be moved automatically into position at the bagging machine, be filled, and moved away to storage or transportation medium with a minimum of handling by workers under conditions where the machine operator works in an atmosphere which has been freed from dust by collectors or other means.

To Reopen Quarry

COGGINS GRANITE & MARBLE INDUSTRIES, Elberta, Ga., has already purchased machinery and equipment in preparation for opening the old Wildcat Quarry at Graniteville, Mo. Monroe A. Edmonds will be in charge of operations.

FINANCIAL

RECENT DIVIDENDS

Alpha Portland Cement Co.	$1.25	Dec. 10
Bessemer Limestone & Cem. Co.	1.00	Nov. 1
Pacific Portland Cement Co.	1.62½	Oct. 30
Riverside Cement Co.	1.25	Nov. 1
Standard Silica Co.	.12½	Nov. 15
Whitehall Cement Mfg. Co.	3.50	Nov. 10
Arundel Corp.	$ .25	Oct. 1
Peerless Cement Corp.	.50	Oct. 1

GLEN FALLS PORTLAND CEMENT CO., Glen Falls, N. Y., has reported the following account of income for the years ended December 31, 1946:

	1946	1945
Net sales	$2,052,458	$1,078,751
Mfg., etc., exp.	1,758,378	984,657
Depreciation	120,152	127,577
Oper. profit	173,928	33,483
Other income	9,313	8,182
Total income	183,241	25,301
Bd., int., etc.	19,250	17,000
Pensions	5,086	5,859
Dbt. acct. res.	2,000	.....
Fed. inc. tax	46,000	.....
Inc. tax ref.	.....	.....
Pr. yr. tax adj.	.....	.....
Net income	110,905	47,160
Preferr. divs.	6,000	6,000
Common divs.	20,300	.....
Surp. for year	84,605	54,160
Surplus, 1-1	702,638	756,797
Surplus, 12-31	787,243	702,638
[1] Times chgs. earn.	9.15	.....
Earn., pfd. sh.	$110.91	Nil
Earn., com. sh.	2.58	$1.33
No. of pfd. shs.	1,000	1,000
No. of com. shs.	40,600	40,600

[1] Before income taxes.

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., placed the capital stock on a regular dividend basis of $2 per year, payable semi-annually in December and June, declaring a regular semi-annual dividend of $1 and an extra of $1, both payable on December 15 to stock of record December 1. The previous payment was $1.25 December 14, 1946.

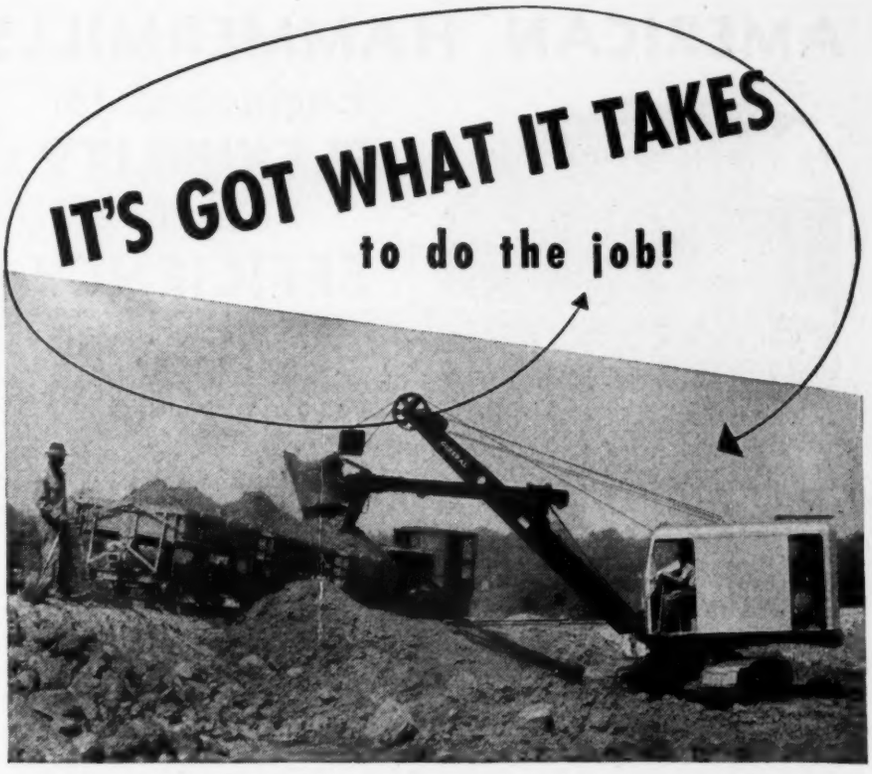
INTERNATIONAL MINERALS AND CHEMICAL CORP., Chicago, Ill., had a net income of $3,826,992, or $4.35 a share for the fiscal year ended June 30, 1947, as against $2,925,657, or $3.92 a share for the same period in 1946. Net sales in 1947 totaled $41,302,250, an increase of 20 per cent over $34,373,106 reported last year.

LONE STAR CEMENT CORP., New York, N. Y., has presented the following account of income for the nine months period and for the quarter ended September 30, 1947:

	1947	1946
Earned per share	$4.78	$3.78
Sales	$34,493,467	$30,436,353
Prof. after depr. & depl.	8,423,761	7,046,768
Total income	8,806,610	7,527,446
Fed. & other taxes	3,653,634	3,155,428
Contg. res., etc.	616,457	789,906
Net profit	4,536,519	3,582,102
No. capital shares	948,597	948,597

ALPHA PORTLAND CEMENT CO., Chicago, Ill., in authorizing $1.25 as a year-end common payment, brought this year's total payments to $2 as against $1.75 for the preceding year.

NATIONAL GYPSUM CO., Buffalo, N. Y., in August sold additional $2,500,000 2½ per cent installment notes and $2,500,000 3 per cent sinking fund notes to institutional investors, at par, under its note agreement dated February 3, 1947. As of August 25, there were $7,500,000 notes of each issue outstanding. Proceeds were added to the working capital.



The GENERAL Biting into the mucky clay, getting a full dipper load . . . swinging around and up, reaching 'way out . . . dumping the load exactly where it's wanted! In less time than it takes to tell it, the GENERAL power shovel has completed the operation and is swinging back for more.

Over and over again, under the most difficult conditions, finishing the work in a hurry . . . that's the way a GENERAL power shovel is built to operate. The record tells why you can depend on a GENERAL to come through, time and again, with efficient, low-cost operation. That means time, money and manpower saved on your job when you've got a GENERAL. Plan now for the time when you, too, can enjoy the advantages that only a GENERAL can provide. The new GENERALS, tested and proved in service, will be ready soon . . . information is available now.

THE RECORD: 98% OF ALL THE GENERALS EVER BUILT ARE STILL IN ACTIVE SERVICE!

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

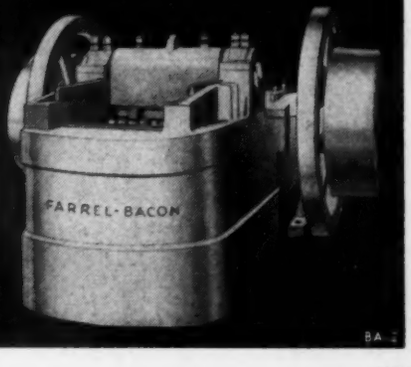
THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR

MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ¾ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

LONGER PRODUCING LIFE BUILT INTO
FARREL-BACON
CRUSHERS

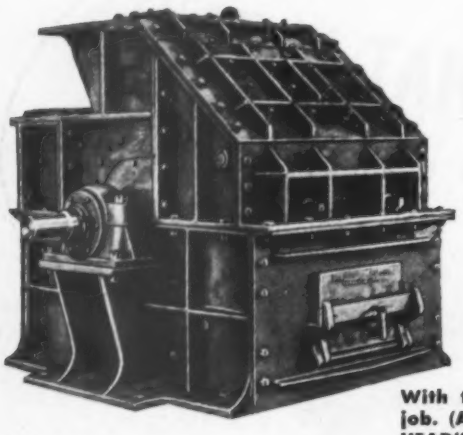
Permanent strength and operating efficiency is engineered into these crushers at every vital point. Farrel-Bacon will provide industrial units or completely designed and equipped plants, including screens, elevators and conveyors. Also other types of mine, quarry, sand and gravel plant machinery. *Write for complete information.*

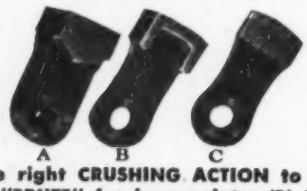


FARREL-BACON
ANSONIA, CONNECTICUT

AMERICAN HAMMERMILLS

Engineered for
FLEXIBILITY
and
EFFICIENCY





A B C

With the right CRUSHING ACTION to suit the job. (A) "BRUTE" for heavy duty, (B) "BROAD-HEAD" for medium reduction, (C) "SPLITTER" for fine reduction.

American ACS Crushers are built for high capacity, heavy duty production with individual size control and easy external adjustments that assure a uniform run of desired sizes from roadstone coarseness to agstone fineness. Conventional front feed gives minimum fines and a coarser product. Special center feed gives longer travel in hammer circle with finer product and maximum fines.

Send for New Bulletin "Better Stone Crushing."

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1245 MACKLIND AVE.
ST. LOUIS, 10, MO.

SLASH COSTS
with Sauerman Machines

ECONOMICAL STOCKPILING
Picture shows how one-man Sauerman Scraper handles a 25,000-ton pile of phosphate rock at Florida drying plant. Operation is changed quickly from storing to reclaiming.

DEEP PIT DIGGING
This Sauerman Slackline Cableway is moving gravel from a wet pit 90 ft. deep, delivering direct to screens at cost of few cents a cubic yard.

THREE main economies are assured by using Sauerman Scraper or Cableway Machines for long haul work such as moving sand and gravel out of pits or ponds, stripping, stockpiling, bank excavation, etc. These economies are:

(1) Digging, hauling and automatic dumping are merged into a continuous rapid operation controlled by one operator.

(2) Power requirement is moderate.

(3) Maintenance is simple.

Sauerman machines offer handling capacities from 10 to 1,000 tons per hour and operating spans from 200 to 1500 ft. Specifications of the various sizes and types of machines, together with illustrations of their uses are given in the Sauerman catalogs. Write for this literature today.

SAUERMAN BROS., INC.
530 S. Clinton St., Chicago 7, Ill.

NATIONAL GYPSUM CO., Buffalo, N. Y., reported the following statement of consolidated earnings for the nine months period ended September 30, 1947:

	1947	1946
Net sales	$97,520,568	$73,055,157
Cost of sales	75,981,283	60,458,183
Selling, etc., exp.	11,044,015	10,256,055
[1] Operating profit	10,495,271	2,340,919
Other income	630,211	390,652
Total income	11,125,481	2,731,570
Interest	232,240	200,118
Debt disc. & exp.	3,300	
Income taxes	4,100,000	895,000
Retire. plan pay.	262,393	231,880
Income tax ref.	*cr* 167,638	[2] *cr* 725,000
Bank loan prem.	134,250	
Net profit	6,560,936	2,129,572
4½% pfd. divs.	562,950	573,019
$2 pref. stk. divs.	838,536	559,074
Surp. for period	5,159,450	997,479
Earn. surplus, 1-1	9,934,008	8,502,684
Adjustments	*dr* 4,455	*cr* 4,455
Earn. surpl., 9-30	15,089,003	9,504,618
[3] Times hg. earn.	45.55	
Earn., pfd. share	$39.40	$12.65
Earn., pref. share	24.96	5.57
No. of pfd. shares	166,500	168,300
No. pref. shares	240,247	279,537

[1] After deprec.: 1947, $1,136,522; 1946, $1,079,890.
[2] Resulting from carry-back provisions, included in net profit below.
[3] Before income taxes.

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., has published the following account of income for the three months period ended September 30, 1947:

	1947	1946
Sales revenue	$2,644,026	$2,066,606
Cost of Sales	2,081,501	1,645,524
Selling, etc., exp.	288,944	204,078
Deprec. & deplet.	142,548	66,231
Operating profit	131,033	150,773
Other income, net	2,173	42,342
Total income	133,206	193,115
Fed. income tax	63,500	65,700
Net profit	69,706	127,415
Preferred divs.	16,538	16,538
Surplus for per.	53,168	110,877
Earn. pfd. share	$4.74	$8.49
Earn., com. share	0.10	0.20
No. of pfd. shares	14,700	15,000
No. of com. shares	555,911	555,924

ALBERENE STONE CORP. OF VIRGINIA, Schuyler, Va., had net sales of $117,186 and a net income of $10.273 for September, 1947, compared with sales of $59,125 and income of $1,530 for September of last year. Net sales for the nine months ended September 30 were $806,142 as against $444,581 for the same period in 1946. Net income for the three quarters was $37,364 with an earning of $0.57 per share. Net income for the first three quarters of 1946 was $1,420, and $0.02 was earned per share.

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., has presented the following account of income for the three months period ended September 30, 1947:

	1947	1946
Net sales	$4,674,726	$3,911,881
Costs & expenses	3,707,135	3,026,054
Depreciation & depletion	137,884	126,472
Operating profit	829,707	759,355
Other income, net	82,375	8,721
Total income	912,082	768,076
Funded debt int.	24,486	28,259
Fed. income tax	325,500	230,425
Net profit	562,096	509,392
Earn.. com. share	$1.07	$0.97
No. of com. shares	525,967	525,693

BATESVILLE WHITE LIME CO., Batesville, Ark., reported its first mortgage bonds, bearing interest at 5 per cent, called for payment at par September 1, 1947.

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., has reported a consolidated net profit of $3,246,752 for the year ended September 30, 1947, as against $2,569,350 for 1946.

Manufacturers' News

Lancaster Engineering Corp., Lancaster, Penn., manufacturers of hammer mills, Diesel and gasoline engines and farm machinery, has been purchased by Irl A. Daffin from the officers and directors of the New Holland Machine Co., New Holland, Penn., and he has become president of the company. Mr. Daffin was one of the founders of the New Holland group and served as president of the New Holland Machine Co. for six years. He was also president of the New Holland Manufacturing Co., Mountville, Penn., producers of stone crushing and handling equipment.

Screen Equipment Co., Inc., Buffalo, N. Y., manufacturers of vibrating screens for sand and gravel, aggregates, cinders, chemicals, ceramic products, etc., has opened a new plant in Buffalo, N. Y., as part of a $500,000 expansion program. C. Stuart Fielding, son of the founder, the late Alfred E. Fielding, is president of the company; W. Hamilton Milroy is vice-president; and A. W. Fielding is secretary.

A. B. Farquhar Co., York, Penn., manufacturers of farm equipment, conveyor, hydraulic press and special machinery, recently held a 3-day sales convention. William J. Fisher, president, addressed the 1200 employes present at the banquet.

Pioneer Engineering Works, Inc., Minneapolis, Minn., has appointed Truman A. Dunn as sales engineer for Kentucky, West Virginia, Ohio, Indiana, lower Michigan and northern Illinois. Mr. Dunn will make his headquarters at Bloomfield, Ind. During the war he was in charge of crushing operations in Iceland, Hawaii, Tinian, and Okinawa with the Ninth Naval Construction Battalion. Prior to the war, Mr. Dunn was associated with his father in the production of crushed stone and agricultural limestone.

Truman A. Dunn

Chase Bag Co., Chicago, Ill., is commemorating its centennial this year covering 100 years of bag manufacturing experience. The company was founded in 1847 by Henry S. Chase and has continued to prosper in the succeeding years. Ads depicting events in American history are being used to bring the centennial to the attention of the industries served by the company.

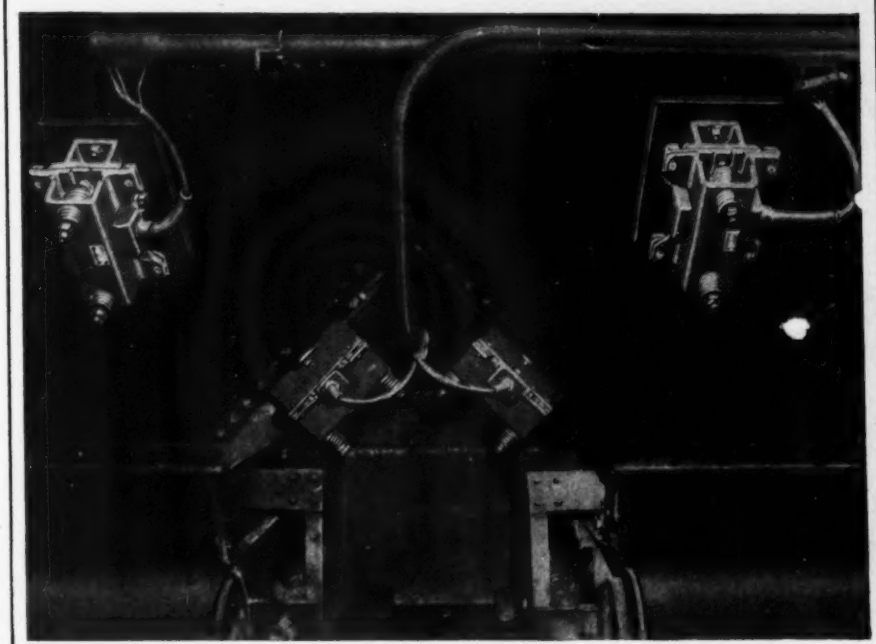
Champion Mfg. Co., St. Louis, Mo., announces that production of masonry cutting saws for precision cutting of all kinds of masonry and ceramic products has finally gone over the hump and orders are now being taken on an immediate delivery basis.

SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS

With Variable Controlled Power



Keep Bins, Hoppers and Chutes Open and Free-Flowing

Eliminate those tattle-tale sledge marks from your bins, hoppers and chutes — stop man-hour and production losses that originate with arching and plugging.

Put these powerful pulsating electromagnets to work — just flick the switch and watch the material flow.

Send us a description of your particular problem — giving thickness of hopper wall, cubic content, etc. — we'll be glad to submit recommendations.

SYNTRON CO.

450 Lexington **Homer City, Pa.**

PULVERIZERS

Hundreds of Installations . . Use Bradley Pulverizers

for the reduction of

AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.

MACWHYTE WIRE ROPE

is correct for Rock Product operations

Use MONARCH Whyte Strand Internally Lubricated, PREformed Wire Rope... YOUR BEST BUY!

When you use the correct wire rope, both the rope and your equipment last longer, cost less to operate. Macwhyte engineers and distributors are at your service to give you the correct wire rope for your equipment.

A useful wire rope handbook and buyers' guide will be sent to you on request. Ask your Macwhyte distributor or write Macwhyte Company for Catalog G-15.

NO. 903

MACWHYTE WIRE ROPE
Manufactured by Macwhyte Company
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FASTER LOADING, LIFTING, SCRAPING

"The Ottawa" Industrial Hydraulic Front End Loader saves hundreds of man hours on every job. A rugged heavy duty attachment for industrial type tractors that loads bulk materials, does light bulldozing jobs and operates as a portable crane. A year 'round labor saver—will do hundreds of odd jobs better faster. Handles loads up to 4,000 pounds, lifts to a height of 9½ feet. It is shipped complete with super-powered Hydraulic system. Bulldozer, Boom and Snow Plow attachment available to give you maximum productive use of your industrial tractor. Hundreds now in use by contractors, quarries, building material and coal dealers and municipalities.

Write today for prices and illustrated bulletin. Immediate shipment. Fits most models industrial tractors.

Ottawa STEEL PRODUCTS, Inc.
INDUSTRIAL DIVISION
OTTAWA, KANSAS · U. S. A.

Lincoln Electric Co., Cleveland, Ohio, anounces the appointment of R. H. Newton as manager of dealer sales, with headquarters in Cleveland. He was formerly district sales manager of the Minneapolis office.

Osgood Co. and General Excavator Co., Marion, Ohio, announces that Robert Maynard, export sales manager, has returned from a three and one-half months' market survey tour of the West Indies and Central and South America.

Hinderliter Tool Company Division, H. K. Porter Co., Inc., Tulsa, Okla., has announced the acquisition of all manufacturing rights for "Nail-It" pipe couplings, mud guns, swivel joints and pump suction couplings. The new trade name will be "Nail-It-Kwik."

Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp., New York, N. Y., has announced the appointment of H. C. Allington as general manager of sales, with headquarters in New York. James A. Old has been named sales manager of the hardware products department, and Paul E. TenHoopen will become sales manager of the Realock fence department under J. S. Eskin, general manager of sales, with headquarters in Buffalo. William J. Murray will continue as assistant sales manager in New York.

Lima Locomotive Works, Inc., Lima, Ohio, and General Machinery Corp., Hamilton, Ohio, have merged and will operate under the name of Lima-Hamilton Corp. Lima Locomotive Works will become the Lima Shovel and Crane Division of the new corporation. Samuel G. Allen and John S. Dixon, former board chairman and president, respectively, of the locomotive works will occupy the same positions in the Lima-Hamilton Corp. George A. Rentschler, former board chairman of General Machinery Corp., assumes the position of chairman of the executive committee. Henry Barnhart is vice-president in charge of the shovel and crane division; Paul R. Ehrgott is general sales manager and H. H. Buchanan is director of foreign operations.

Lima Shovel and Crane Division, Lima-Hamilton Corp., Lima, Ohio, announces the appointment of Thompson Sage, Inc., Stockton, Calif., as agents for complete line of Lima shovels, cranes and draglines in territory surrounding Stockton.

B. F. Goodrich Co., Akron, Ohio, announces that the selling price of transmission, conveyor and elevator belting today is only about 30 per cent above prewar prices despite the fact that the cost of cotton materials used in the manufacture of these products is 175 per cent higher than in 1940, and labor costs have increased 54.6 per cent. Hydraulic control hose is 12 per cent lower than in 1940, and molded and braided hose and V-belts show increases of 18 to 23 per cent based on present sales prices.

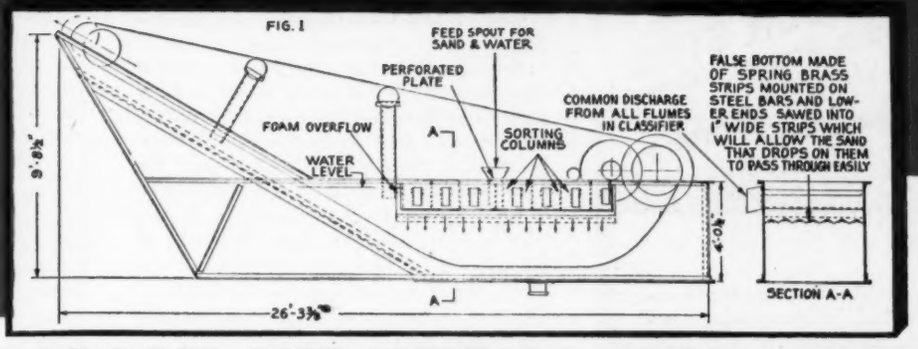


FIG. 1
FEED SPOUT FOR SAND & WATER
PERFORATED PLATE
FOAM OVERFLOW
WATER LEVEL
SORTING COLUMNS
COMMON DISCHARGE FROM ALL FLUMES IN CLASSIFIER
FALSE BOTTOM MADE OF SPRING BRASS STRIPS MOUNTED ON STEEL BARS AND LOWER ENDS SAWED INTO 1" WIDE STRIPS WHICH WILL ALLOW THE SAND THAT DROPS ON THEM TO PASS THROUGH EASILY
9'-8½"
4'-0½"
26'-3⅜"
A
SECTION A-A

*Save **HEADROOM AND INSTALLATION SPACE**
and do a better sand classification job with the
WEBSTER HYDRAULIC SAND CLASSIFIER

Webster offers the following important features:

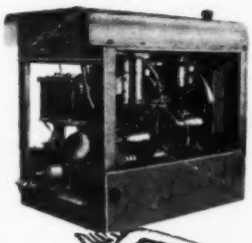
- Sharp line of separation of products.
- Wide range of adjustment.
- Small size. Requires minimum space and headroom.
- No power required.
- Minimum wear and low upkeep.
- No moving parts.
- Close classification. Absence of turbulence in sorting column.
- Maximum weir lengths for minimum sorting column area.

* See articles in the June and September, 1947 Rock Products on the Webster Hydraulic Classifier and proper sand classification.

Write for complete information
WEBSTER MANUFACTURING, INC.
TIFFIN, OHIO
Sand, Gravel and Stone Handling Equipment

JEEP POWER UNITS

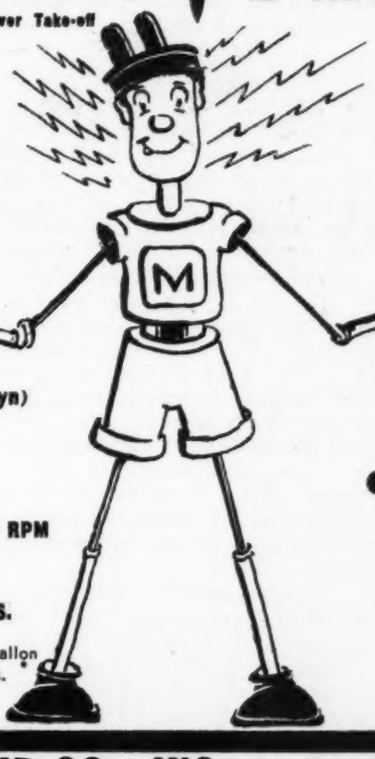
• With Power Take-off



$200.00 EACH (f.o.b. Brooklyn)

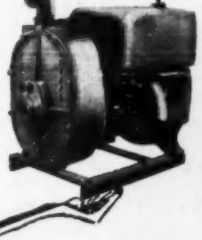
- 3 feet 4 inches High
- 27 IN. WIDE, 42 IN. LONG
- 4 CYLINDERS
- MAX. BRAKE H.P. — 54 AT 4000 RPM
- BORE 3⅛, STROKE 4⅜
- ELECTRIC START
- SHIPPING WT. APPROX. 950 LBS.

*All units delivered complete as illustrated with 12 gallon gas tank under hood plus metal covers for all sides.



2 in. MARLOW PUMPS

• Driven by 3½ H.P. Mercury Gasoline Engine



$110.00 EACH (f.o.b. Brooklyn)

- DELIVERS 55 GALLONS PER MIN. AT 50 FT. HEAD
- MARLOW MODEL 220
- SELF PRIMING
- CENTRIFUGAL PUMP

ESplanade 7-9088

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Dependable steel products and unequalled steel service facilities . . . available for your steel-buying convenience at twelve conveniently located Ryerson plants. Because of great demand, all sizes are not always in stock; but we usually can suggest a reasonable alternate.

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Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles

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ASSURES CONTROL OF YOUR PLANT PROCESSES

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* Makes tests quickly and accurately
* Two to seven separations simultaneously
* One machine for the entire size range
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* Visible separation to refusal
* Few moving parts to wear out
* Engineered for long and practical service

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GILSON SCREEN COMPANY
BOX 186 MERCER, PA.

New Holland Machine Co., New Holland, Penn., announces that I. A. Daffin is no longer associated with the company and that George C. Delp has been elected president.

Hyster Co., Portland, Ore., manufacturers of lift and straddle trucks and tractor-mounted construction equipment, has announced the appointment of Arthur Nikand as factory manager of the Portland plant.

Blaw-Knox Co., Pittsburgh, Penn., has announced the appointment of Cornelius L. Sarosdy as sales engineer for construction equipment in Texas, Oklahoma and New Mexico, with headquarters in Dallas.

Blaw-Knox Co., Pittsburgh, Penn., announces that Chester H. Lehman, executive vice-president; A. A. Levison and R. P. McKenrick of the construction equipment department: L. E. Joseph, vice-president; and R. E. Jones of the Blaw-Knox division, have been presented certificates of appreciation for the company's cooperation with the Inter-American Highway Engineering Conference in promoting a "road-united Western Hemisphere."

Kennedy-Cochran Co., Bellwood, Ill., recently had a grand opening of its new offices, parts and service building in Hillside, Ill. This company represents Allis-Chalmers Mfg. Co., Detroit Diesel Engine Division of General Motors, Foote Co., Bucyrus-Erie Co., Buckeye Traction Ditcher Division of Gar Wood Industries, Inc., LaCrosse Trailer Co., Baker Mfg. Co., etc., in the Chicago area.

Guided Radio Corp., New York, N. Y., announces the sale of its postwar developed sound powered telephone and self powered ringing device, together with all patents, to The Wheeler Insulated Wire Co., Inc., Bridgeport, Conn., subsidiary of the Sperry Corp.

Mobilift Corp., Portland, Ore., has announced the appointment of James H. Spence as sales promotion manager, with headquarters in Portland, Ore. Mr. Spence will have direct supervision over sales forces in Chicago, New York, Atlanta and San Francisco.

Caterpillar Tractor Co., Peoria, Ill., has announced the appointment of Lloyd J. Ely, John Elwood and Arthur W. Johnson as managers of the Diesel engine, Diesel track-type tractor, and earthmoving equipment factories, respectively. Announcement is also made of the construction of a new factory in Peoria for the manufacture and assembly of earthmoving equipment.

Davey Compressor Co., Kent, Ohio, announces the appointment of J. S. Larkin Co., 5 N. Front St., Harrisburg, Penn., as distributors of Davey equipment in the following counties: Dauphin, York, Adams, Cumberland, Perry, Juniata, Snyder, Union, Lycoming, Sullivan, Clinton, Center, Mifflin, Huntingdon, Franklin, Lancaster, Lebanon, and Northumberland.

Pennsylvania Refining Co., Cleveland, Ohio, has named James S. Emerick as sales representative for lower Michigan with headquarters in Detroit, and has appointed Frank D. Messenger as direct factory sales agent for Penn Drake Snow Plow Wax in the lower Michigan Peninsula, with headquarters at Fair Haven, Mich.

Vulcan Iron Works, Wilkes-Barre, Penn., recently delivered the first of 88 205-ton locomotives to the Turkish Government. The Hon. Fuat Zincirkiran, director general of the Turkish State Railways, accepted the engine from Benjamin S. Dowd, president of Vulcan Iron Works. This is the first locomotive that Turkey has ever bought in the United States.

Pettibone Mulliken Corp., Chicago, Ill., has announced the appointment of W. E. Madden as sales and division manager of the conveyor division of its subsidiary, George Haiss Mfg. Co., New York, N. Y.

Lukens Steel Co., Coatesville, Penn., has announced the following changes in company designations: Lukens Steel Co. and Divisions; By-Products Steel Co., division of Lukens Steel Co.; and Lukenweld, division of Lukens Steel Co.

American Hoist & Derrick Co., St. Paul, Minn., has promoted Lee S. Coulter to manager of the industrial sales division. Mr. Coulter, who has been with the company for 18 years, will direct sales and merchandising for the division through the company's world-wide sales organization. Products covered by the industrial sales division include American locomotive cranes, marine cargo machinery and American boom topping winches.

Lee S. Coulter

Barber-Greene Co., Aurora, Ill., has appointed Hooper Engineering Co., Skaneateles, N. Y., as distributor in central New York, under the direction of Elliot H. Hooper, president, and William D. Hooper, vice-president, also the appointment of Capitol Equipment, Inc., Troy, N. Y., as distributor in the Albany and Mohawk Valley territory, under the management of James C. Gallagher, president, and Charles R. Crotty, vice-president.

Air Reduction Sales Co., New York, N. Y., has appointed Harold H. Reed as manager of the metropolitan New York district. He succeeds W. S. Schoenthaler, who is retiring after 37 years of continuous service with the company. Oren M. Donohue, formerly assistant sales manager, succeeds Mr. Reed as assistant manager, and William B. Brower succeeds Mr. Donohue as assistant sales manager.

INDUSTRY NEWS

Block Filler

HOW MANY manufacturers of concrete block have been aware of the advantages gained by filling the cores of block with a lightweight granular insulating material?

In the Southwest where scoria is used for the aggregate and it is highly desirable to insulate against the summer heat, one manufacturer has made tests which indicate that by filling the cores with granular scoria, the flow of heat through the unfilled walls can be reduced about 46 per cent. This means that if 100 units of heat normally flow through the scoria block, filling the cored openings will reduce the heat flow to 54 units. Pumice, Haydite, Waylite and other lightweight aggregates will show corresponding reductions.

Health Board Prepares Plaint Against Block Plant

AUTHORITY to prepare a complaint against Dumont Twin Borough Cement Block plant, Hackensack, N. J., has been issued to Dumont Borough Attorney Walter Jones by the Board of Health, following the plant's failure to level a cinder pile and construct cinder bins as agreed at a recent hearing. Residents of the area charged at the time that the 30-ft. cinder pile jeopardized the health of residents near the plant when the wind blew in their direction.

Concrete Admix

HOPPER PRODUCTS, INC., New York, N. Y., has developed a concrete admix, known as Portite, which is said to improve concrete, plaster, and mortar. It is claimed that ¼ pint per bag of cement will provide a more easily workable concrete with less water (reduced in some cases by as much as 35 per cent). Other advantages claimed for this product are reduced shrinkage, elimination of segregation and dusting. It is said that the concrete can be made water-tight after a short curing time by the addition of ½ pint of Portite per bag of cement.

How Strong Is Concrete?

AT a recent meeting of concrete products manufacturers in Los Angeles, Calif., one speaker mentioned that ocean-going boats made of pumice concrete constructed during the first World War were abandoned and broken up on the beach near Monterey, Calif. The speaker had cut cylinders from these pumice concrete boats that showed 8000 p.s.i. compression strengths. No doubt the concrete was excellent to start with, but possibly the puzzolanic action of the fines, plus more complete hydration due to the porous nature of the aggregate accounted somewhat for this strength. Several who heard this talk asked just what strength concrete can attain when made of pumice or other lightweight aggregates. What is your highest recorded strength of concrete made with lightweight aggregates or heavy aggregates?

Forms New Company

JOPLIN CEMENT CO., Joplin, Mo., has formed a new company to be known as the Home Conditioning Co. Although it will operate independently of the ready mix plant, the personnel of both organizations will remain intact. E. F. Gaines is president of the new firm.

Pavement Yardage

AWARDS of concrete pavement for October and for the first ten months of 1947 have been announced by the Portland Cement Association as follows:

Square Yards Awarded

	During Oct., 1947	During First 10 Months of 1947
Roads	1,946,447	18,493,492
Streets and Alleys	1,109,988	12,947,920
Airports	203,221	1,453,443
Total	3,259,656	32,894,855

Wage Increase

MINNEAPOLIS CONCRETE BLOCK MANUFACTURERS ASSOCIATION, representative of nine firms in the Minneapolis, Minn., area and the AFL Cement Finishers union recently agreed to a 12½ cent per hour general wage increase. The union first asked for double the amount finally agreed upon and the association first offered 10 cents.

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, held its first annual sales conference at Columbus recently with over 50 representatives present from the company's plants in eight states. Harold K. Schellenger, director of public relations, Byer & Bowman advertising agency, and Prof. H. R. Coterman of Capital University were speakers at the meeting. H. X. Eschenbrenner is president of the company.

HALCRETE PRODUCTS CO., Wichita Falls, Tex., is now using half of its output of concrete building block to build an additional wing to its plant. The new wing will include a storage vault, office room, shower and locker rooms and several steam-chambers, Hal E. Dungan, president of the concern, said.

INTER-LOCKING BLOCK CO., Wisconsin Dells, Wis., has been incorporated with a minimum capital of $1500 for the manufacture and sale of concrete block, construction business and to deal in builders' supplies. Principals are Erik Anderson, L. H. Albertson, and J. F. Motelet.

CHARLES KERNS, Kenton, Ohio, has purchased a cement block factory at Kenton and will shortly go into the manufacture of concrete block and tile. He also will handle cement.

KENNETH GRAVES of Graves Brothers Construction Co., Melvin, Iowa, has opened a ready-mix concrete plant at Sheldon, to be known as the Concrete Aggregates Co. The Graves brothers, who operate a concrete plant at Melvin, Iowa, recently opened a ready-mix plant at Worthington, Minn.

LORAIN CONCRETE PRODUCTS CO., INC., has been incorporated at Lorain, Ohio, by Rev. F. W. Loose, Gustav A. Braun, A. L. Braun and R. G. Ohrstrom. The company, which was purchased from Beaver Park Products Co. last February, is producing only building block at present, but plans are being made for the manufacture of tile.

CONCRETE MATERIALS CO., Galesburg, Ill., has opened a new ready-mixed concrete plant in Galesburg.

ST. HENRY CEMENT PRODUCTS CO., Coldwater, Ohio, is now producing concrete block at the rate of 240 per hour and concrete tile at the rate of 400 sections per hour at its new plant in Coldwater. Linus Lammers is the owner.

AMERICAN BRICK & STONE CO., Bridgeport, Conn., has started the production of Dunbrik at its new brick manufacturing plant. Fred Birbarie is in charge.

MAYOTTE CONCRETE PRODUCTS, Port Arthur, Ont., recently opened its new $60,000 plant and is now in the process of making concrete and cinder-concrete block for building.

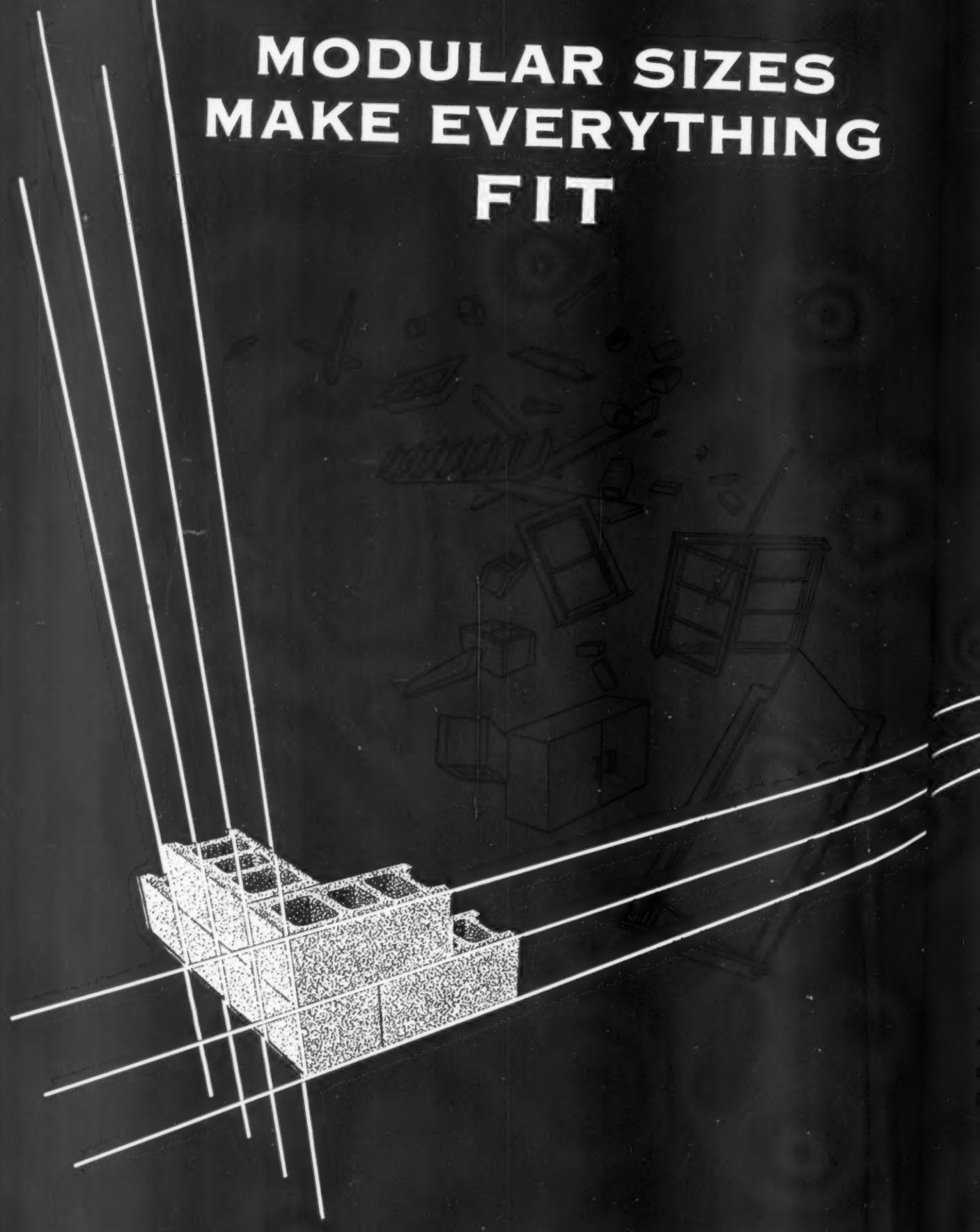
HAROLD HAYNES has started the manufacture of waterproofed cement block at Frederick, Ill. The new business carries the name of the Haynold Concrete Products Co.

JENNINGS CEMENT PRODUCTS CO., LeMars, Iowa, has been incorporated to manufacture, buy, sell and deal in cement, concrete block and other concrete products. Authorized capital stock is $10,000, all of which has been in cash. Acting president is J. P. Jennings; acting vice-president, Martin J. Jennings; and acting secretary-treasurer is Alvin Jennings.

WESTERN READY MIXED CO., Quincy, Ill., has received a charter to produce, buy and sell at wholesale and retail, sand, gravel, cement, lime, etc. Authorized capital is 10,000 shares of common stock, no par value. Incorporators are Orville Flaiz and John Fierke, Quincy, and Mencer H. Celander, Moline.

W. W. BLACKBURN CO., INC., Clearwater, Fla., has been granted articles of incorporation showing the capital stock to be 100 shares, no par value, with $600 capital authorized. Incorporators are W. W. Blackburn, Estelle L. Blackburn, Larry K. Sheldon, Hugh Coil, and B. F. Harrell.

MODULAR SIZES MAKE EVERYTHING FIT



BESSER MANUFACTURING CO., ALPENA, MICH., U. S. A.

Complete Equipment for Concrete Products Plants

In Building

CLUTTER AND CONFUSION

Become

SIMPLICITY AND ORDER

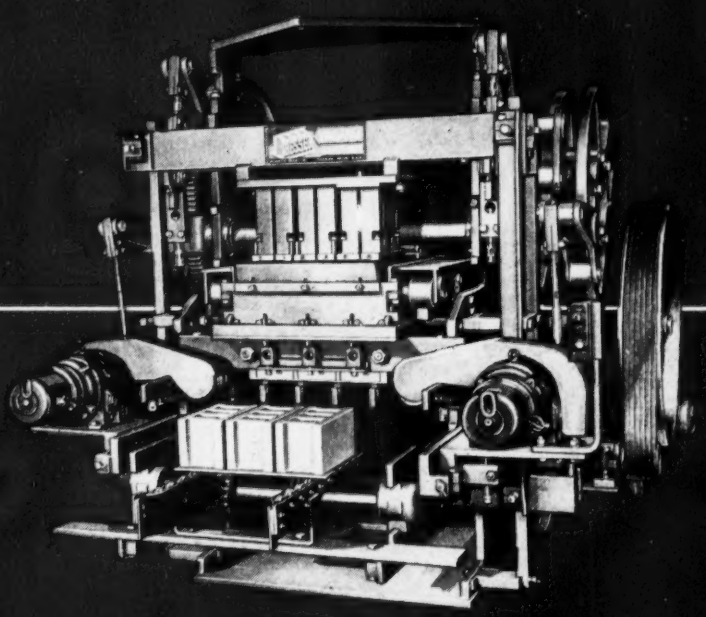
Through

MODULAR COORDINATION

A greatly simplified, uniform [illegible] urement that accurately [illegible] and vertical dimensions in relation to the whole [illegible] all the various standard building [illegible] used to make a complete structure . . . eliminates re-dimensioning, both in the plant and on the job . . . makes everything come out RIGHT, from start to finish.

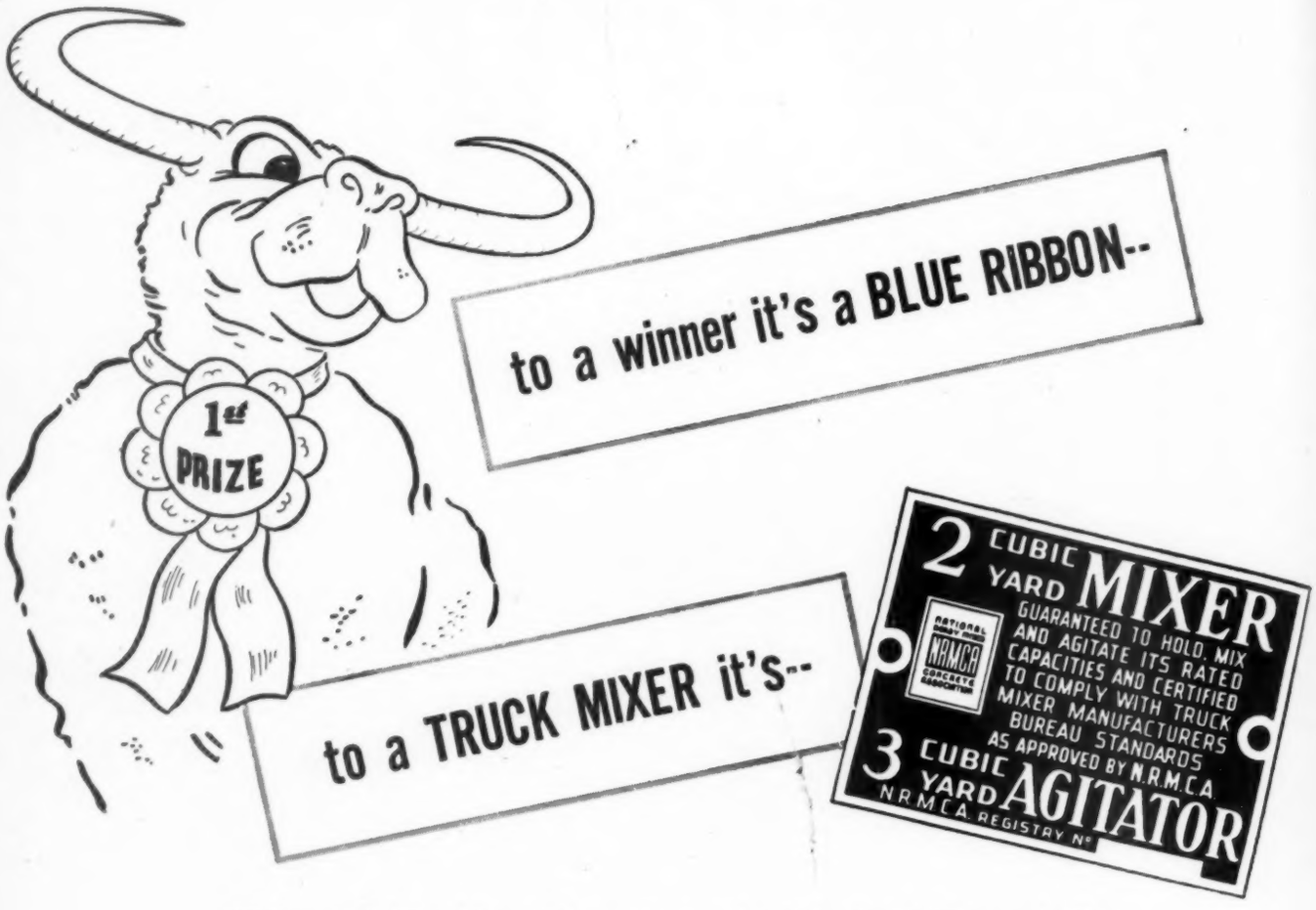
BESSER PLAIN PALLET SUPER VIBRAPAC

The dependable, automatic, high volume producer of concrete block of consistent, high quality and uniform size in modular dimensions, coordinating with standard building products.



BESSER MANUFACTURING CO., ALPENA, [illegible] U. S. A.

Complete Equipment for Concrete Products Plants


1st PRIZE
to a winner it's a BLUE RIBBON--
to a TRUCK MIXER it's--
2 CUBIC YARD MIXER
GUARANTEED TO HOLD, MIX AND AGITATE ITS RATED CAPACITIES AND CERTIFIED TO COMPLY WITH TRUCK MIXER MANUFACTURERS BUREAU STANDARDS AS APPROVED BY N.R.M.C.A.
NRMCA
3 CUBIC YARD AGITATOR
N.R.M.C.A. REGISTRY No.

"Winner"! The blue ribbon on a prize winning bull practically shouts a story of achievement—of careful, accurate breeding.

On a truck mixer, the Truck Mixer Bureau rating plate is equally vociferous in proclaiming the achievement of the mixer in meeting the standards set up by the Bureau for your protection. You can be absolutely certain of full rated capacity . . . of protection against "outlaw" sizes. In the words of the plate, the truck mixer is "guaranteed to hold, mix, and agitate its rated capacities and certified to comply with Truck Mixer Manufacturers Bureau standards as approved by the N.R.M.C.A."

When you buy a truck mixer, that plate is our pledge that you can buy with confidence . . . operate with accuracy.

Truck Mixer Manufacturers Bureau

Affiliated with The National Ready Mixed Concrete Association

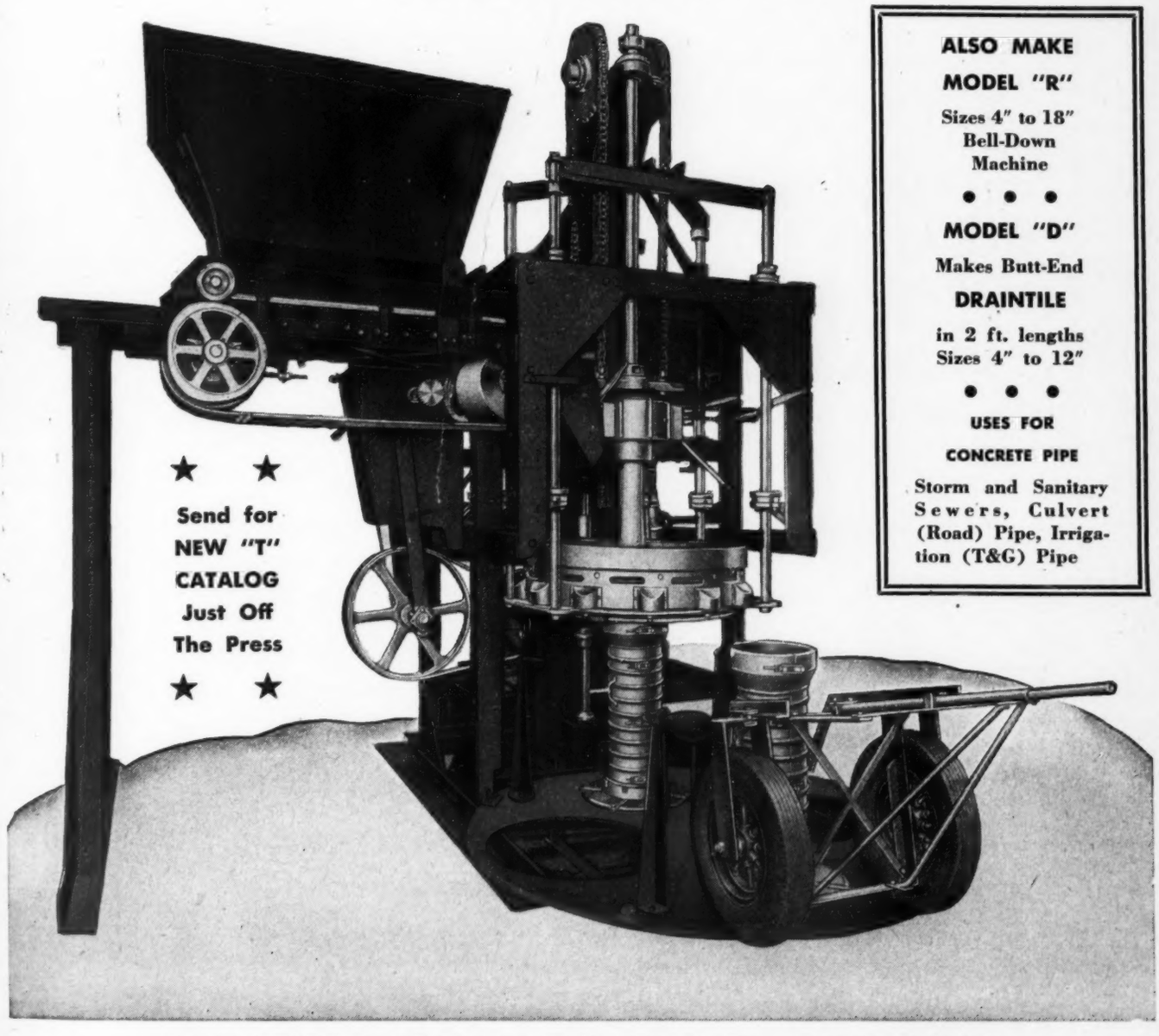
BLAW-KNOX DIVISION Pittsburgh, Pa.	**CONCRETE TRANSPORT MIXER CO.** St. Louis, Mo.	**RANSOME MACHINERY COMPANY** Dunellen, N. J.
CHAIN BELT COMPANY Milwaukee, Wis.	**THE JAEGER MACHINE COMPANY** Columbus, Ohio	**THE T. L. SMITH COMPANY** Milwaukee, Wis.

Concrete Pipe Machinery Co.

MODEL "T" BELL-UP "McCRACKEN" MACHINE

FOR MAKING PLAIN AND REINFORCED CONCRETE PIPE

Range of sizes — 4" to 36" — 90% of the Market



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Sizes 4" to 18" Bell-Down Machine

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Makes Butt-End

DRAINTILE

in 2 ft. lengths Sizes 4" to 12"

• • •

USES FOR CONCRETE PIPE

Storm and Sanitary Sewers, Culvert (Road) Pipe, Irrigation (T&G) Pipe

PACKER-ROLLER-HEAD PROCESS

LEADS THE WAY TO MORE PROFITABLE PIPE BUSINESS

Eight-Hour Shifts Produce:

SEWER

Plain B & S Pipe—
2400 feet — sizes 4" to 10"
1750 feet — sizes 12" to 18"
1200 feet — sizes 21" to 24"

For Full Details Write to

CULVERT "ROAD"

Reinforced T & G Pipe—
1600 feet — sizes 12" to 18"
1100 feet — sizes 21" to 24"
900 feet — sizes 30" to 36"

Concrete Pipe Machinery Co.

EXPORT OFFICE
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Cable Address: Macpipe

MAIN OFFICE
Sioux City (19), Iowa, U. S. A.

THERE'S STILL ONE CONSTRUCTION COST THAT CAN BE CUT IN HALF!

☆ *In poured concrete construction, form costs usually account for 60% of total costs*

ATLAS SPEED FORMS REDUCE FORM COSTS UP TO 50% OR MORE

☆ *They cut (1) form labor costs; (2) actual form costs; (3) Assembly and stripping time*

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FORM & TANK CORPORATION
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CONCRETE FORMS

For All Types of Poured Concrete

WALL FORMS	CAISSONS
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TUNNEL FORMS	CENTERING
BRIDGE PIER	MANHOLE FORMS
CONCRETE PIPE	COLUMN FORMS

TRAVELING WALL FORMS

Our facilities and services include estimating, layouts, blueprints, etc. Our engineering department is prepared to answer all questions about concrete form work. Data sheets available on request.

ATLAS FORMS reduce labor costs of form work so considerably that contractors have challenged the accuracy of our figures on more than one occasion. But the saving *is* there—let us show you.

In the last few years our staff has studied and solved almost every type of form work problem. Our organization consists of successful contractors and engineers, plus our steel fabricating experts and our own fabricating plants.

Their knowledge and our facilities are yours on request.

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Irvington Form & Tank Corp.
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GET A LOAD OF THIS LOW-COST MIXING!

Speeding to your construction work, the new Ransome Blue Brute Horizontal Truck Mixer has a way of turning out the best in concrete at costs that mean money in the bank for you. Features like these are the secret of its always expert performance:

Exclusive drum design, stronger and lighter, with Ransome's famous mixing action . . . chilled car wheel metal rollers, each on two Timken roller bearings and running on extra-heavy, heat-treated track . . . smooth, positive gear-and-pinion drive . . . improved transmission with single lever control, two speeds forward and reverse, separate engine clutch and multiple disc reversing clutches . . . trouble-free water system with enclosed pump-clutch, leak-proof poppet valves and unbreakable anti-freeze gauge glasses.

Built with capacities of 2, 3, 4½ cu. yds., this new Ransome Truck Mixer is easier to start, to control, to maintain —a sure bet for time-saving, economical concrete production in transit.

Up above, of course, that's another Blue Brute leader — a Ransome "Big" Mixer — top performer at so many central mixing plants and big-time construction jobs . . . and another reason why *there's more worth in Worthington-Ransome.* R7-4

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

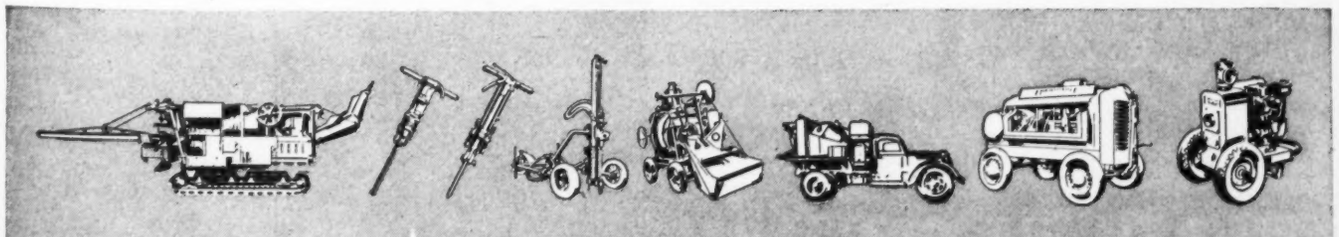
WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON

Worthington Pump and Machinery Corporation. Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

ALERT OPERATORS

BUY BUTLER TO MEET

COMING COMPETITION

As suggestions which will help you in your problems and in your decisions, BUTLER BIN COMPANY has prepared a profusely illustrated catalog of Ready Mixed Concrete Plants. A copy is yours on request. Ask for Bulletin 185.

It does not require a crystal ball to foresee the coming competition for those in the Ready Mixed Concrete industry. Firm delivery schedules and firm competitive prices will govern the awards.

Alert Ready-Mixed Concrete Plant operators, well aware of competitive conditions in the very near future, are already "buying Butler", for they know that Butler Engineered Design provides a wider margin of efficiency, higher daily output, lower costs, and consequently greater profit.

Dominance in your market depends upon your decision now.

"Buy Butler". It's as simple as that!

BUTLER BIN COMPANY

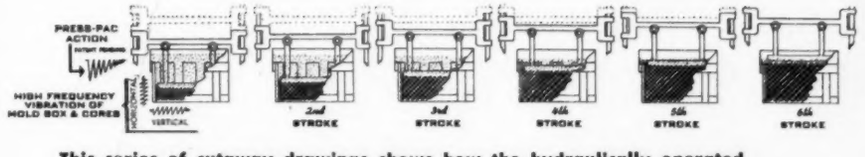
WAUKESHA, WISCONSIN

BUILDERS ARE... *demanding* THE NEW GEORGE *Redi-Furred** BLOCK

Alert block plant owners are whipping competition with this new, thoroughly tested masonry unit. Wherever shown, it wins instant approval from contractors and builders. And no wonder! This revolutionary type block, made exclusively on the GEORGE SUPER-V with PRESS-PAC —

- Eliminates the need for furring and lathing.
- Insulates against heat and cold—25% less heat loss.
- "Baffles" the creeping of moisture and frost.
- Lays faster and with a better bond.
- Simplifies electrical and plumbing installations by permitting wide interior channels.

Red arrows show moisture and frost, seeking to penetrate to the inside wall, "baffled" at every point by the staggered air spaces.



This series of cutaway drawings shows how the hydraulically operated PRESS-PAC head packs the aggregate firmly by going down into the mold box 6 to 10 times with 2,400 lbs. of force while the mold box and cores are vibrating. *Result: A masonry unit of uniform strength and density throughout, and with extremely water-repellent walls.*

Save time and labor!

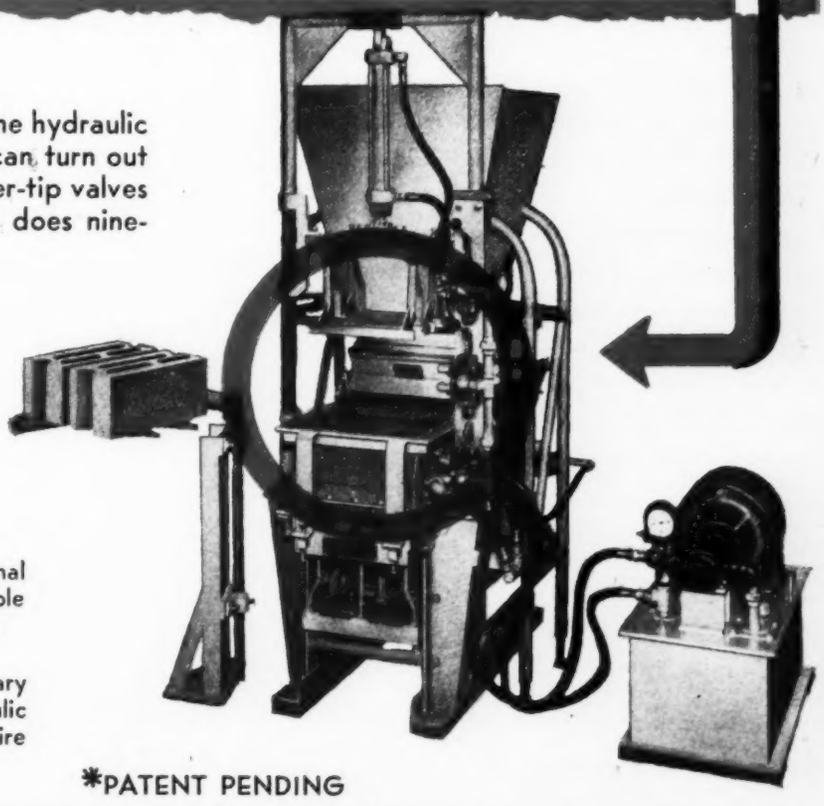
One man, working at normal speed on the hydraulic GEORGE SUPER-V with PRESS-PAC, can turn out 360 to 480 blocks per hour. Three finger-tip valves control the hydraulic mechanism which does nine-tenths of the work.

And strength tests?

Block plant owners are finding that they get twice the strength in blocks made on the GEORGE SUPER-V with PRESS-PAC, while using the same mix as before installation of the new George equipment!

Mold Boxes and Cores for making conventional type two and three cell blocks are also available on the GEORGE SUPER-V with PRESS-PAC.

For further information about the revolutionary REDI-FURRED block and the amazing hydraulic GEORGE SUPER-V with PRESS-PAC, call, wire or write:



*PATENT PENDING

F. C. GEORGE MACHINE CO.

100 SOUTH WESTMORELAND DRIVE • ORLANDO, FLORIDA

HERE'S WHY READY-MIX OPERATORS

Tell 'Em to Use 'INCOR'

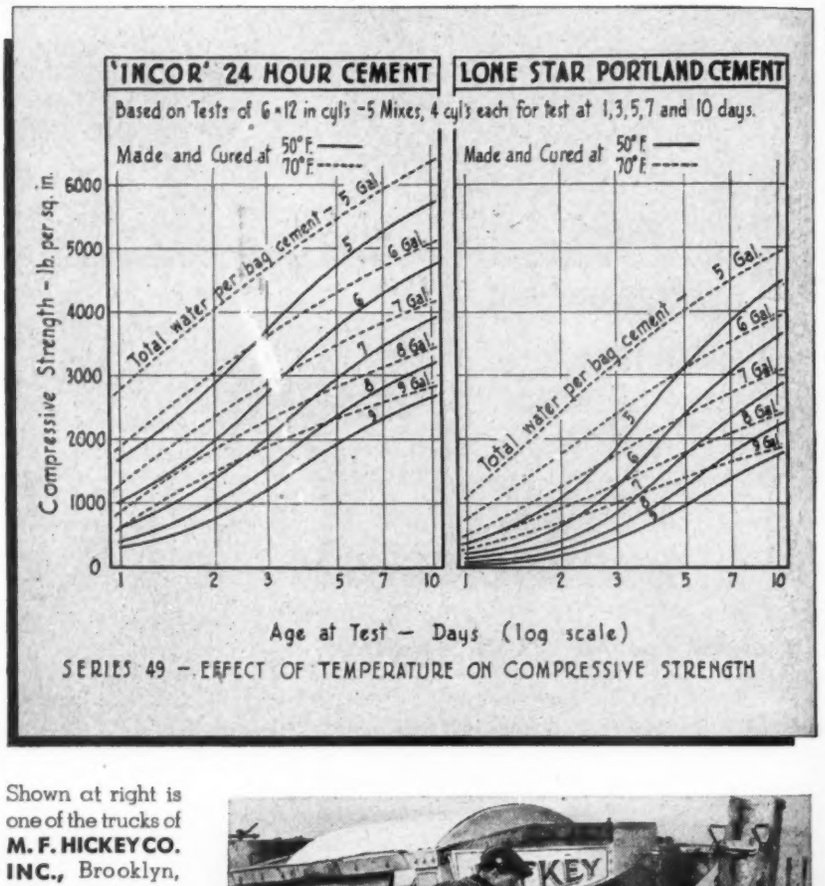
'INCOR' KEEPS FALL JOBS ON SCHEDULE — SAFEGUARDS AGAINST FREEZING

THERE'S usually more risk of frost-bitten concrete in the Fall than in dead of Winter. Because, when it gets really cold, the tarps and salamanders are on the job. But in Fall it is apt to be 60° or 65° at noon and 32° or lower by midnight. Daily temperatures, averaging around 50°, retard hardening, slow down the job, and if a sudden freeze sets in, unprotected concrete may suffer.

That is why Ready-Mix customers so often ask for 'Incor' concrete. Graph, at right, explains why. It shows that at 50° — a common Fall condition — 'Incor' concrete attains stripping strength and is safe from freezing 2 or 3 days sooner than ordinary concrete. *Also keep in mind that as temperatures go down, 'Incor' savings go up.*

To keep jobs on schedule and reduce frost hazard, tell your customers to use 'Incor'* concrete for Fall and Winter work. It will build good-will — and all of us can use plenty of that!

*Reg. U. S. Pat. Off.


'INCOR' 24 HOUR CEMENT
LONE STAR PORTLAND CEMENT
Based on Tests of 6 x 12 in cyls -5 Mixes, 4 cyls each for test at 1, 3, 5, 7 and 10 days.
Made and Cured at 50° F. 70° F.
Compressive Strength - lb. per sq. in.
Total water per bag cement
5 Gal.
6 Gal.
7 Gal.
8 Gal.
9 Gal.
Age at Test — Days (log scale)
SERIES 49 — EFFECT OF TEMPERATURE ON COMPRESSIVE STRENGTH

LONE STAR PORTLAND CEMENT
'INCOR' HIGH EARLY STRENGTH PORTLAND CEMENT
LONE STAR AIR-ENTRAINING PORTLAND CEMENT
LONE STAR MASONRY CEMENT
LONE STAR CEMENTS MEET EVERY CONSTRUCTION NEED

Shown at right is one of the trucks of **M. F. HICKEY CO. INC.,** Brooklyn, delivering ready-mixed 'Incor' concrete to a Fall job, where the Hickey organization recommended 'Incor' to the contractor.

LONE STAR CEMENT CORPORATION

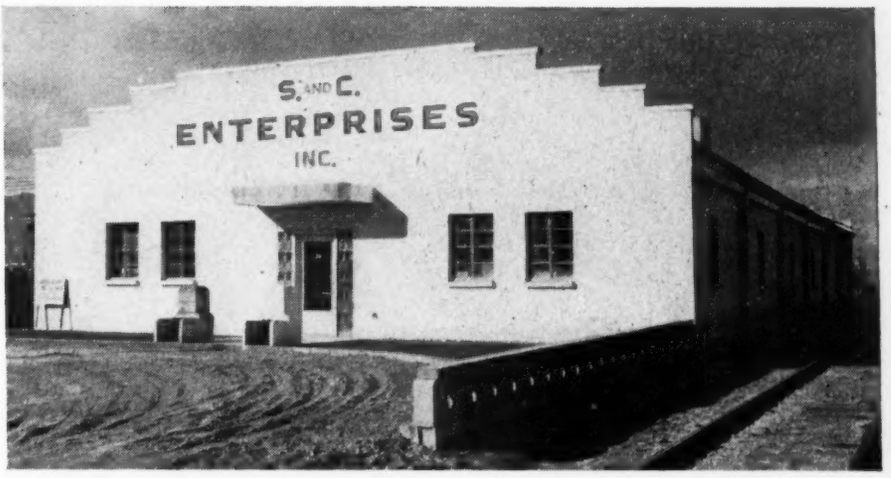
Offices: ALBANY • BETHLEHEM, PA. • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25,500,000 BARRELS ANNUAL CAPACITY

From Log Cabin to Modern Block Plant

Veterans build up successful Colorado Springs, Colo., block business in two years

Original block plant was housed in this humble log cabin just two years ago



Modern concrete products plant recently completed. Note the use of flue block capped with partition block for the wall, to the right, and the two incinerators in front of the door

By W. B. LENHART

DURING the past three years there has been a tremendous growth in the concrete products industry. The number of new plants is hard to determine, but in many cities, in the 25,000 population range or greater, ten or more new plants have been started. When inquiries are made as to what has, or is happening, to many of these small beginners the answer usually follows a pattern about as follows:

"Well, most of the new plants were started up by war veterans who thought, with a small capital investment, they could establish a business but they soon found out what they were up against and for one reason or another either quit or sold out; too bad, etc."

However, there probably were many young veteran operators who did not follow this pattern, at least the S and C Enterprises, Inc., of Colorado Springs did not comply with the foregoing generalization. The veterans operating this rapidly growing business started in a small way about two years ago in Colorado Springs, and just recently moved to a new location where a 50- x 115-ft. concrete block building has been built to house two F. C. George block machines and the new Lith-I-Block machine. The two F. C. George Machine Company block machines have been mounted back-to-back so that the single Kent continuous mixer can serve both machines. The manually operated block machines can turn out close to 360 8- x 8- x 16-in. block per hour. A larger size Kent continuous mixer has been installed to serve the Lith-I-Block machine which has been producing at the rate of 500 8- x 8- x 16-in. block, or equivalent, and is set up to make 4-, 6-, 8-, and 12-in. sizes and also flue block. This enterprising company is now producing septic tanks, incinerators, lintels, and also metal scaffolding in addition to block.

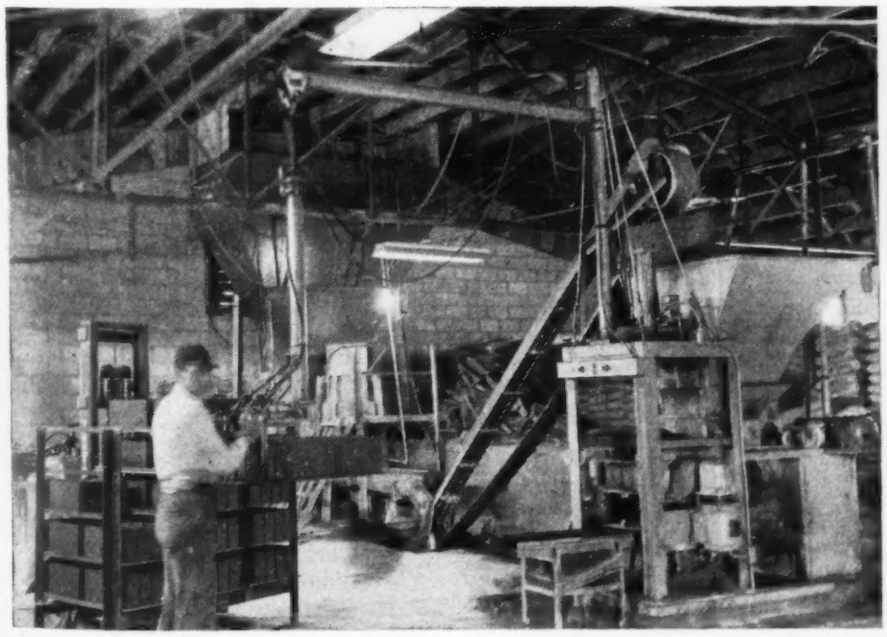
The owners and officers of this company were discharged from service about two years ago, and incorporated their company which they called the S and C Enterprises, Inc. At the time of incorporation they were a little undecided as to just what the "Enterprises" part of the name would be, but as a starter they entered the concrete masonry business and have been making excellent progress ever since.

The three owners and officers are: F. C. Colton, president; Kenneth Schmidt, vice-president, and J. D. Stone, secretary-treasurer and office manager.

Blocks with sand and gravel, pumice, and scoria aggregate are manufactured. The scoria is purchased from producers in the Des Moines, N. Mex., area. Pumice blocks are finding an excellent reception. It might be said that the use of pumice blocks is growing faster than the other aggregates with prices for the pumice running about 4¢ per unit higher (for the 8's) than the other aggregates. Pumice is purchased from the Pumice Aggregate Sales Corporation, Albuquerque, N. Mex., which has a sizing and processing plant at Domingo, N. Mex.

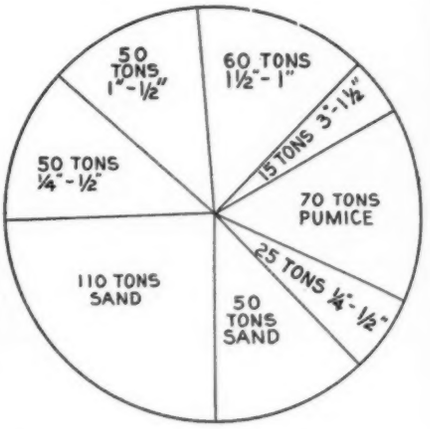
Aggregates, delivered to the plant over the Rock Island siding track, are pushed to the boot of a bucket elevator by an International "30" tractor. A Farmall-International scoop lifter also is available for handling aggregates. The aggregate bins discharge to the continuous Kent mixer. This device has two small hoppers, one for the aggregate and one for the cement. The small hoppers, resting on a reciprocating pan mechanism, the speed and rate of delivery of which can be accurately controlled, discharge to a small-diameter conveyor or pug mill that acts as the mixer. The mixer

(Continued on page 184)



Latest types of concrete block machine installation with pneumatic off-bearer, and in the background continuous mixer feeding hopper of inclined belt conveyor to hopper of block machine

Belt conveyors deliver aggregate from truck hoppers to the bins over ready mixed concrete and block plant, to the left



Plan of aggregate bin over ready mixed concrete plant

Produce Wide Variety of Concrete Products

RAPID STRIDES have been made by the Yakima Cement Products Co. since it started in 1920 with a small plant on north Front street, manufacturing concrete pipe and block along with some ready mixed concrete. Another expansion occurred in 1930 when the plant at its present location on South First street began the manufacture of a wide variety of precast concrete products; septic tanks, burial vaults, pipe, block, and ready mixed concrete. During the next 15 years the company gradually added to its facilities, and increased its fleet of mixer trucks. The year 1946 witnessed the start of a comprehensive construction program which included a modern 500 cu. yd. per day ready mixed concrete plant, using a 2 cu. yd. Rex mixer for the pre-shrunk concrete. In the same structure a new Besser Super Vibrapac concrete block machine was installed. The fleet of mixer trucks has grown to eight 3-cu. yd. Jaeger mixers that normally haul 4 cu. yd. of the pre-mixed concrete.

Sand and Gravel Plant

Up to 1942, the company purchased its sand and gravel, but during that year acquired an old plant near Yakima, in the East Selah area. In 1946 a new plant was started at a different location which is a modern up-to-date plant for washing sand and gravel and crushing rock. One of the features is a novel, and effective ground storage and reclaiming system. This consists of a 125-ft. inclined stacker belt that is pivoted at its lower end, allowing the belt assembly to be swung around two-thirds of a full circle. The stacker belt is powered by a Louis-Allis motor through a Foote Bros. gear reduction unit. A semi-circular tunnel of heavy wood frame construction has been built at ground levels so that trucks can drive into this tunnel and load from gravity gates.

Slackline cable-way bucket and hoist installation

Timbers supporting this tunnel are 8 x 8's for the posts with 8 x 12's for the caps. The posts are placed on 16-in. centers except where the truck loading gates are located. At these points the posts and caps are far enough apart to span each gate about 30 in. Plank lagging is used.

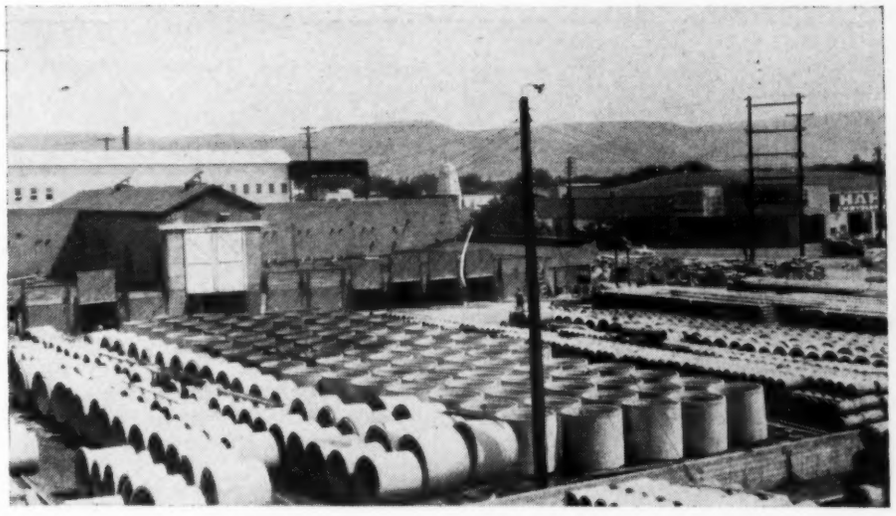
To separate the different size aggregates, partition walls of log and lumber have been provided. The partitions consist of two sloping wall sections that form an inverted "V." The "above ground" tunnel runs through these partitions. There are nine compartments formed by these partitions; the storage pile has a capacity of about 20,000 cu. yd. The tunnel system is divided into two units, half of the total radius being on one side of a truck roadway and the other half of the radius being on the opposite side. The illustrations show this unique storage system.

At the pit a 3-cu. yd. Sauerman dragline is used. Any plus 5-in. gravel is discarded at the outset by a grizzly over a pan feeder serving the main belt to the washing and screening plant. A 3000 g.p.m. Pomona pump furnishes water to the top of the screening and washing plant where the material from the belt conveyor is discharged over three sets of stationary screens and the material is divided into the desired sizes. The sand is washed in six tipple boxes and then discharged into bunkers. Oversize material is carried from the screen in launders or flumes to the worked out portion of the pit. The plant is so arranged that any size of rock desired may be delivered to the crushers which consist of a 1-ft. 8-in. Traylor and a 2-ft. Symons crusher.

Three sizes of crushed gravel are prepared on a Tyler vibrating screen. The plant has a capacity of 500 cu. yd. per 8 hr.

Yakima Cement Products Co., Yakima, Wash., produces its own source of sand and gravel aggregate for ready mixed concrete, block, pipe, septic tanks, burial vaults and other products

By W. B. LENHART



Concrete pipe storage yard with steam kilns in background

The concrete products division of the Yakima Cement Products Co. can be divided into two parts; the old section where pipe from 4-in. to 60-in. diameter are made on three, locally-built pipe machines; the special products are also made in this section. Eleven steam kilns are available for the pipe and special shapes.

Concrete Products-Ready Mix

Besides fabricating concrete pipe, the company has long made a practice of installing irrigation and drainage pipe on a contract basis, and during the Spring months have five to six crews out on this type of work. The company has three trenchers, a Buckeye ditcher and an Insley back-hoe digger and a rented rig.

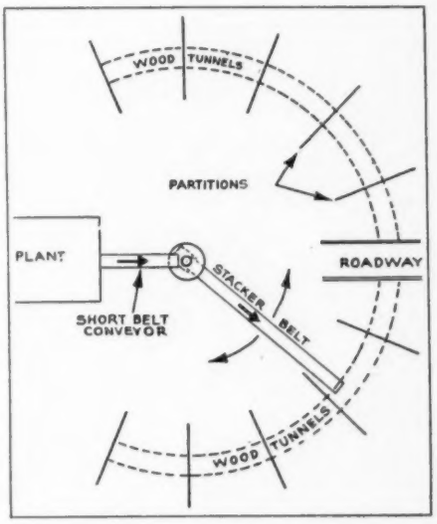
Many years experience were drawn upon by the company in designing the new ready mixed concrete and block plant as well as some ideas gained by an extensive trip through the West. The main structure comprises a reinforced concrete storage bunker holding about 300 cu. yd. located above the second floor of the plant. On the second floor is located a 2-cu. yd. Rex mixer for preshrinking the concrete aggregate before delivering to the transit mix trucks. Also on the second floor is the 40-cu. ft. Besser mixer which furnishes material to the Besser Super Vibrapac block machine located on the ground floor. Two steel silos, independently supported by steel superstructures, are used to store cement, each hold 750 bbl., one for high-early strength cement and one for standard. The aggregate bunker is divided into eight compartments, each designed to hold specified amounts of the various sizes used. The following tabulation gives the size and type of aggregate and the tonnage:

	Size	Tons
	3- to 1½-in.	15
	1½- to 1-in.	60
	1- to ¼-in.	50
	½- to ¼-in.	50
Sand	¼- to 1/12-in.	110
Sand	1/12-in. to 0	50
	½- to ¼-in. (crushed)	50
Pumice		70

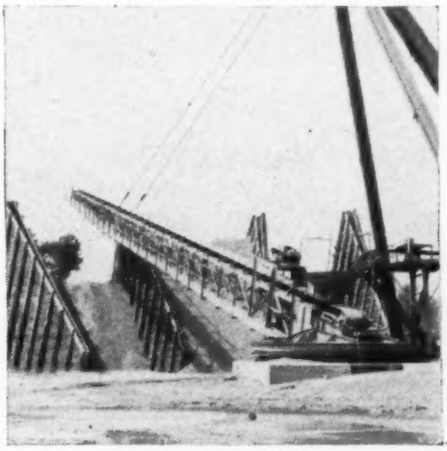
Aggregates from the bin can be sent to the ready mixed concrete weigh-batcher or to the 40 cu. ft. Besser mixer by a system of short Stephens-Adamson belt conveyors. These conveyors (not required for all aggregates) are mounted up close to the bottom of the bin over the operating platform. A system of electrical controls for all operations has been installed.

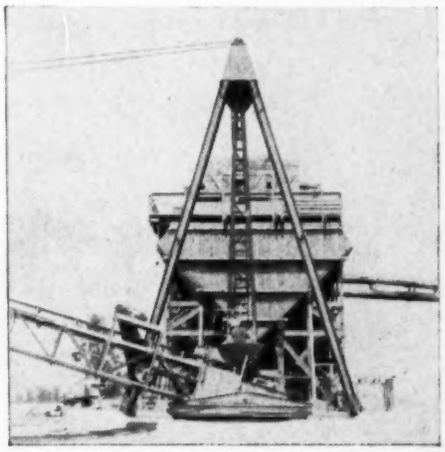
Aggregates are delivered to the plant by trucks which unload to four unloading hoppers under which are 16 air-controlled gates. Two inclined belt conveyors deliver the material to the top of the storage bins. The belts are driven through S-A gear reduction units and G. E. motors.

The Besser block machine rests on

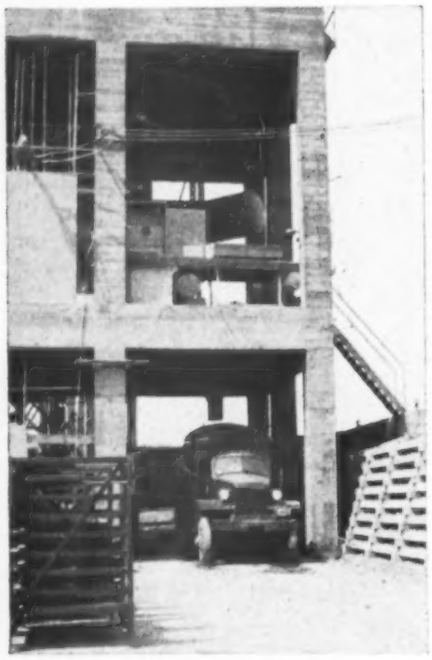


Showing layout of stack belt and storage area. Stacker belt swings in a 240-deg. arc





Left: Ground storage of aggregates reclaimed by trucks driving through wood-framed tunnels. Center: Stacker belt pivots in an arc of 240 deg. Right: A-frame and turntable for stacker belt. Note inverted cone hopper to receive material from conveyor belt



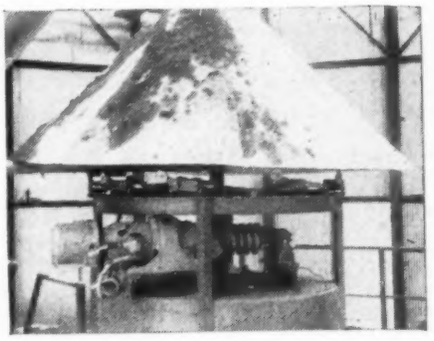
Mixer truck pulling out with load of concrete from batching plant

Block machine installation. Note the heavy, reinforced concrete construction of plant

Portable loader on truck chassis loading truck from stockpile

the ground floor, a short distance from the four kilns. The block machine turns out 8000 of the 8- x 4- x 12-in. block which is quite popular in this district. Two Clark lift trucks handle the racks. The company has a second plant at Grand View which is about 40 miles south of Yakima. Here one pipe machine is used.

Officers of the company are: W. P. Hews, president; R. O. Howard, vice-president; and J. R. Sherman, secretary-treasurer. Chas. Cooper is superintendent of the sand and gravel plant, and C. W. Dugan is superintendent of the block plant.



Mechanism for changing position of chute over ready mixed concrete aggregate storage bins

FROM LOG CABIN TO MODERN PLANT

(Continued from page 181)

arms have replaceable sections to allow for wear. Water sprays discharge to the mixer section at a rate sufficient to give the desired slump. The mixed product then goes to an inclined, ribbed conveyor belt that serves the two George Press-pak block machines. These machines are electrically vibrated and also mechanically tamp the "green" concrete.

Two steam kilns, each 18- x 60-ft., hold 2000 standard blocks each. A steam curing cycle of six hours is used. A Towmotor lift truck is employed for handling the "green" and cured blocks. Cement is purchased in paper bags.

When the weather is not favorable, block are "cubed" inside the plant, but a 100- x 100-ft. concrete slab is available outside for this work during most of the year.

To unload a car, the bagged cement is first piled onto wooden pallets, and the Towmotor unit then hauls them out of the car. In this manner a carload of bagged cement can be unloaded in about 1½ hours. Steam for the two kilns is provided by an automatic, gas-fired steam boiler. Steel racks for handling the blocks have been made from metal tubing obtained from war surplus airplane stock, making a neat, substantial rack. In the shop, a drill press, lathe, and electric welding equipment is available for this work and maintenance.

Colorado Springs is known to most as a summer resort as the climate there is ideal with many scenic attractions nearby. During the war it received considerable stimulation due to the establishment of training camps, etc., but industrially it is also growing with a big demand for construction materials. One of several large concerns taking advantage of Colorado Springs' resources is the Timken Roller Bearing Co., which is building a plant across the street from the S and C Enterprises, Inc.

•

CHARLES PETERSON, president of the Ideal Cement Stone Co., Omaha, Nebr., since 1905, has retired. Albert Johnson became the new president and treasurer. Earl W. Peterson is vice-president and secretary of the company.

Interior of block plant before the installation of the latest block manufacturing equipment. Note lift truck moving block to curing room

NEW DEVELOPMENTS
In Concrete Delivery Units

ALL MANUFACTURERS of truck mixers for delivery of ready-mixed concrete have incorporated new design features into their equipment and most of the emphasis has been on mixers of the high discharge type. The postwar mixers are streamlined versions that have been designed for faster charging, speedy discharge and more thorough mixing than their predecessors. Maintenance factors, appearance and ease of operation have been stressed.

Blaw-Knox Co. has just announced production of its "Hi-Boy Trukmixer" which marks this concern's first entry into the manufacture of a high discharge unit and is its first new design since before the war. Horizontal units designated "Lo-Boy" will continue to be manufactured.

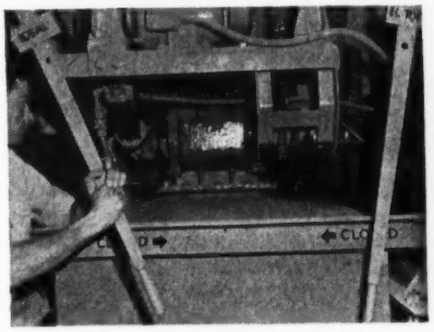
The high discharge mixer has a revolving hopper for both charging and the discharge as shown in the accompanying illustrations, for which savings in maintenance and other operating advantages are claimed. The hopper is supported directly from the end of the mixing drum cone and moves with the drum when the truck frame weaves under field operating conditions. Its design is to assure a tight, lasting seal between the hopper and drum to prevent leakage of grout.

While charging, the hopper is held in upright position by a latch which prevents the hopper from rotating with the mixing drum. For discharge, the operator opens the latch, permitting the hopper to rotate 180 deg. with the drum where it is again held with the latch while the mixed concrete is discharged through the same hopper in an inverted position. The hopper latches automatically in each position and a 32-in. unrestricted opening is provided for fast charging of the drum.

The entire diameter of the cone end of the drum is effective for charging and the hopper serves as a confining chute when in inverted position for discharge.

Other features are a quick opening and closing inspection hatch and two-compartment water tank. Standard sizes are 2, 3, and 4½ cu. yd. with corresponding agitator capacities of 3, 4¼ and 6⅛ cu. yd.

Smith-Mobile truck mixers, manufactured by T. L. Smith Co., have a number of new features incorporated into their design. Capacities available are 2, 3, 4½ and 5½ cu. yd., as mixers, which have corresponding agitator capacities of 3, 4¼, 6⅛ and 7⅜ cu. yd.



Automatic cement feeder valve of Blaw-Knox, showing operating mechanism including air-operated cut-off gate

Bigger Payloads

All four sizes have been enlarged in drum volume and have new ratings to conform with standards of the Truck Mixer Manufacturer's Bureau. Bigger payloads without overloading and better mixing were the objectives. The new units provide for injecting the mixing water through the charging opening of the drum, without water bells, and the water pipe stays out of the concrete. For subfreezing temperatures and when mixing is done at the delivery point, provision is made for introducing water into the closed end of the drum by closing one valve and opening another to send the water through a shorter pipe. Valves and water pipe are protected from freezing by the heat generated by the engine.

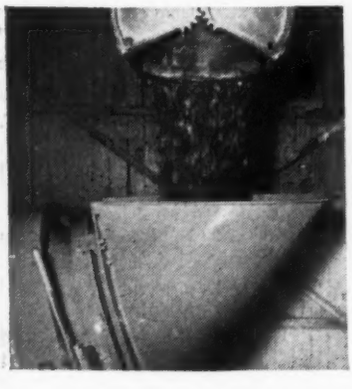
Postwar Smith-Mobile truck mixer for high discharge

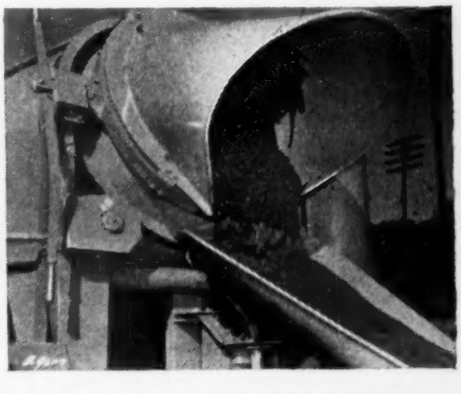
An improved sealed bearing is provided for the revolving sealing door which closes the drum opening. The bearing is protected by the charging cone in the drum and a perfected self-adjusting metal sealing ring which automatically compensates for wear. The feed chute is self-aligning and is adjustable both horizontally and vertically to solve the problems created by distortion of the truck chassis.

The overflow type tank has been replaced by a syphon type for measuring tempering and flush water. The transmission has been simplified and lightened and the front drum support has been improved, the main bearing consisting of two Timken roller bearings sealed in a self-aligning case cushioned in rubber within the bearing housing. Mixing drums are enlarged and have thicker shells and blades and yet, it is claimed, that very favorable weight has resulted from improved design and use of better materials.

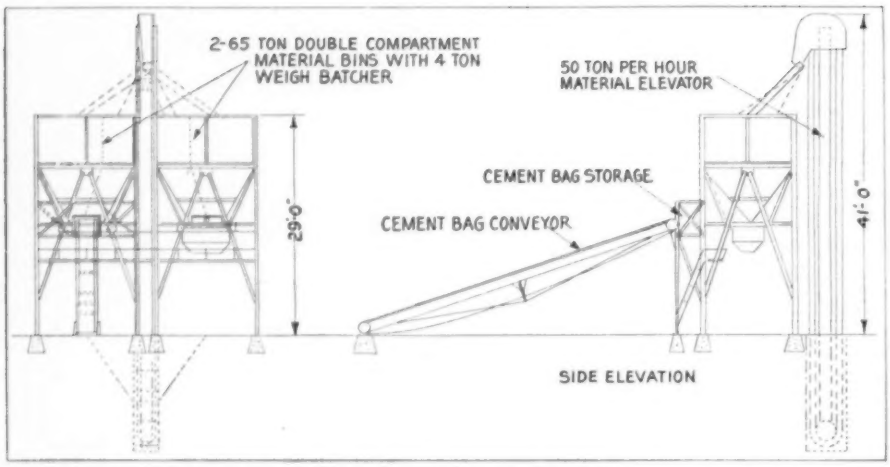
Chain Belt Co.'s new line of Rex Hi-Discharge Moto-Mixers consists of 2-, 3- and 4½-cu. yd. mixers, meeting Truck Mixer Manufacturer's Association standards for drum volume and batch rating. Corresponding agitator capacities are 3-, 4½- and 6⅛-cu. yd.

Mixing and discharge of low-slump concrete have been emphasized in the new designs which provide refinements in drum shape and in blade size and location. Interchangeable dieformed blades are bolted on to facilitate replacement, and discharging speed has been improved, most noticeably in discharging concrete mixes of lower slumps, according to the manufacturer.





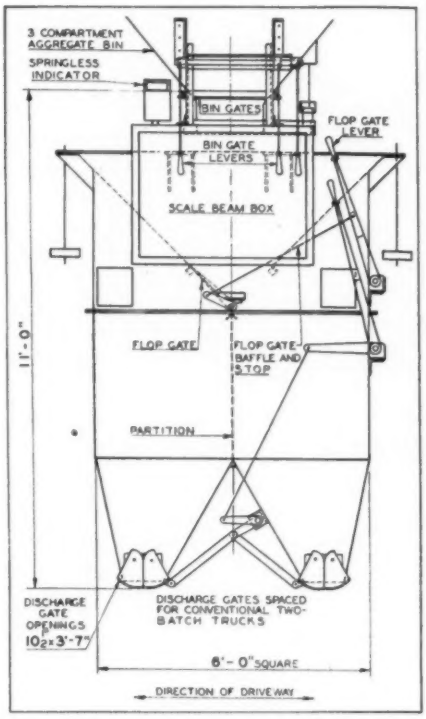
Center: New high discharge truck mixer of Blaw-Knox. Left: Hopper in charging position and, right, same hopper inverted for discharge



Elevation drawing of new batching plant manufactured by Concrete Transport Mixer Co.

The mixer employs a chain drum drive instead of gears in contact with the drum, resulting in a three-point suspension. A self-aligning front drum bearing mounting on which the drum rotates is one point of suspension and two rear drum rollers at the discharge end are the other two suspension points. These features are said to prevent misalignment or distortion caused by weaving of the frame when traveling over rough terrain.

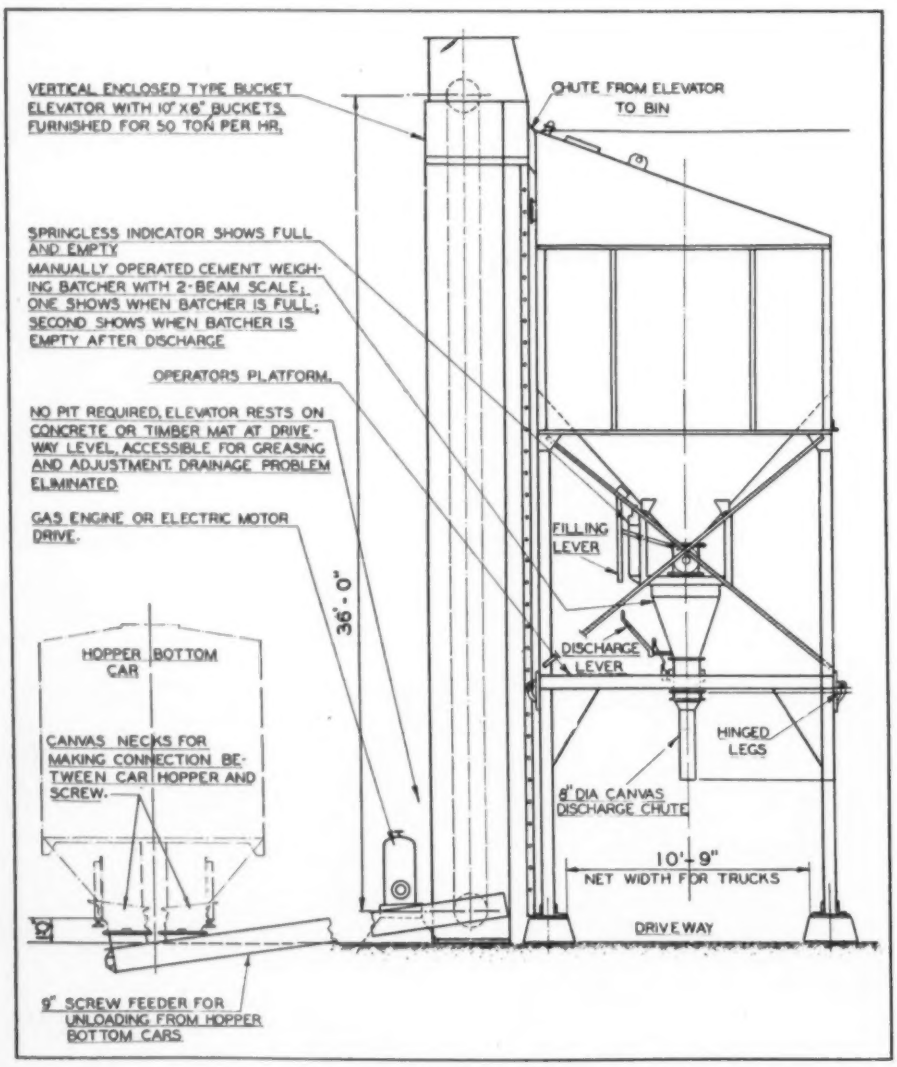
Mixing is accomplished in the discharge direction, the concrete batch traveling from the front up to the rear or high end of the drum. Gravity pulls it back with the result there is a constant end-to-end batch flow, plus cascading action from top to bottom, which is claimed to speed mixing time and approach the efficiency of a large stationary mixing plant.



Blaw-Knox aggregate weighing batcher to speed up truck loading

A wide charging hopper is provided and the spiral scoops in the drum have been designed to pull the batch in quickly. A 34-in. discharge opening is standard and the water system is enclosed.

Jaeger Machine Co. has enclosed the front end of its Hi-Dump mixers and improved the transmission, drum mounting and charging hoppers. The drum opening has been enlarged and overhead water tanks have been eliminated in favor of a water pump for fast, uniform distribution of mixing water into a batch. Water is introduced through a clog-proof water jet.


VERTICAL ENCLOSED TYPE BUCKET ELEVATOR WITH 10"X6" BUCKETS, FURNISHED FOR 50 TON PER HR.
CHUTE FROM ELEVATOR TO BIN
SPRINGLESS INDICATOR SHOWS FULL AND EMPTY
MANUALLY OPERATED CEMENT WEIGHING BATCHER WITH 2-BEAM SCALE; ONE SHOWS WHEN BATCHER IS FULL; SECOND SHOWS WHEN BATCHER IS EMPTY AFTER DISCHARGE
OPERATORS PLATFORM.
NO PIT REQUIRED, ELEVATOR RESTS ON CONCRETE OR TIMBER MAT AT DRIVEWAY LEVEL, ACCESSIBLE FOR GREASING AND ADJUSTMENT. DRAINAGE PROBLEM ELIMINATED
GAS ENGINE OR ELECTRIC MOTOR DRIVE.
36'-0"
FILLING LEVER
DISCHARGE LEVER
HINGED LEGS
8" DIA CANVAS DISCHARGE CHUTE
10'-9" NET WIDTH FOR TRUCKS
DRIVEWAY
HOPPER BOTTOM CAR
CANVAS NECKS FOR MAKING CONNECTION BETWEEN CAR HOPPER AND SCREW.
9" SCREW FEEDER FOR UNLOADING FROM HOPPER BOTTOM CARS

New design of portable cement bin, by Blaw-Knox, of 300-bbl. capacity

Dump Bodies

Non-agitating dump bodies have been adapted to delivery of air-entrained concrete the past several years, and continued study of this equipment under job conditions has led to improved designs.

The Dumpcrete, (Maxon Construction Co.) introduced to the ready-mixed concrete industry less than two years ago, was the first commercially built unit on the market. It provides for high discharge, low center of gravity and, through lightness in weight, is adapted to light truck chassis equipment. It has a cutoff gate to control the rate of discharge, rounded surfaces of the body, a 90 deg. dumping angle and adjustable baffle within the body to enable complete and uniform discharge. A three-section 13-ft. chute is standard equipment.

A third size of the Dumpcrete, of 3 cu. yd. concrete capacity has now been made available to satisfy the demand from those states which have an 18,000 lb. load limit on a single

axle. This unit has a water level capacity of 5 cu. yd., and can handle 6 cu. yd. of aggregates.

Improvements in the 2-cu. yd. unit include the raising of the discharge point by 6 in. and a chute assembly quickly swung aside to permit dumping materials directly out of the body, when the unit is used to haul aggregates and other bulk units. The third unit, of 4-cu. yd. capacity, will haul up to 8 cu. yd. of aggregates.

A 1947 development is the concrete delivery dump body manufactured by Hercules Steel Products Corp. This body also is an all-purpose dump body, designed primarily for delivery of air-entrained concrete but adaptable to hauling bulk materials.

Design provides for complete discharge of concrete from the bottom of the body first, to prevent premature decantation of lighter materials from the top of the load and to eliminate segregation and bleeding. Full-scale production of the 3-cu. yd. capacity body is now underway. Operation of the first Hercules unit was described in the October, 1947, issue of ROCK PRODUCTS, pp. 157-159.

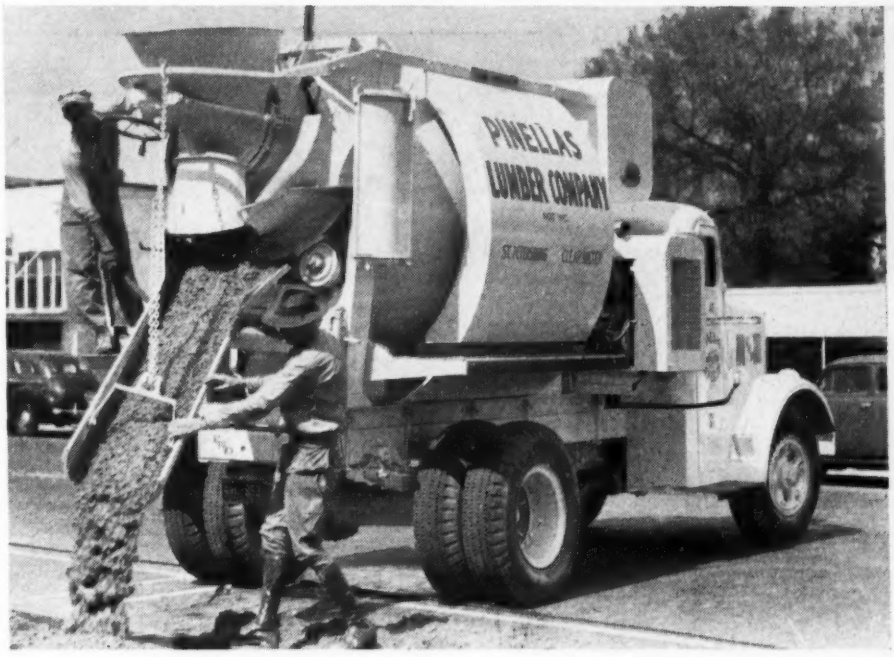
Batching Equipment

Bins and batchers and related equipment have undergone changes in design and are available in a wider variety of sizes and capacities.

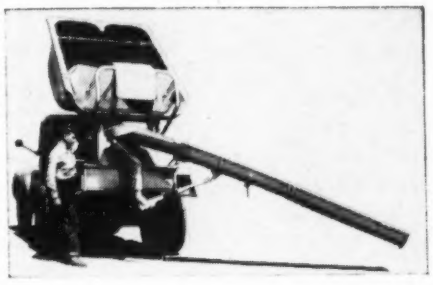
Blaw-Knox Division of Blaw-Knox Co., in its new Bulletin No. 2212, discloses a number of new developments. One is a 2-compartment and a 3-compartment bin for aggregates with dual type weighing batchers which can discharge two measured batches of aggregates simultaneously into a batch truck. A dual arrangement for batching of cement has also been developed. These twin-type weighing batchers have only one set of scales and one beam box and are designed for one-man operation.

A newly-developed Blaw-Knox automatic cement feeder valve for the automatic weighing of bulk cement permits the batcher to be located directly under the cement bin opening and still obtain automatic weighing of cement.

Portable bulk cement plants of new design in capacities from 200 to 800 bbl. have been developed, each a complete plant including elevator equipment, cement weighing batcher and accessories. A new type bin indicator for aggregates is soon to be announced by Blaw-Knox.



One of Chain-Belt Co.'s newest high discharge Rex Motomixer truck mixers



New 2-cu. yd. Dumpcrete for delivery of air-entrained concrete, showing entire 13 ft. of chute in discharge position

Concrete Transport Mixer Co. has a complete new batching plant to tie in with its transport truck mixer in furnishing a complete ready-mixed concrete operation. The first batching plant is a dual bin installation, each bin having a capacity of 65 tons divided into two compartments. A 50 t.p.h. bucket elevator, for either track or truck pit, charges the bin and at the head of the elevator a swivel type chute mounted on a twin table, controllable by the plant operator, is the means of feeding either compartment.

The weigh batcher has 4 ton capacity with a dial reading and is mounted on a tram rail which adapts the plant to be used in conjunction with the production of concrete products. An alternate design provides for handling cement, either in bags on a belt conveyor, or in bulk by weight. Fully automatic water measuring is an integral part of the plant.

One of Conserco Co. high discharge truck mixers (Jaeger), typical of many available on rental to supplement delivery units where more than the normal number become temporarily necessary

Builder's Supply Store

PIONEER SAND AND GRAVEL CO., Seattle, Wash., has opened a branch building materials store across town from the store adjacent to the plant.

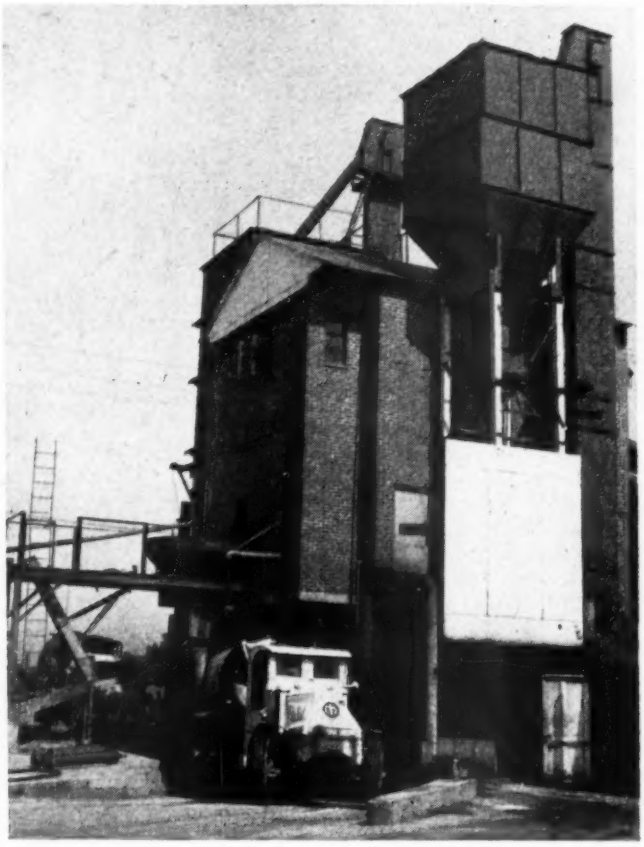
"Pipe Dreams"

H. X. ESCHENBRENNER, president of Universal Concrete Pipe Co., Columbus, Ohio, has an unusual hobby. He puts in his spare time as managing editor of "Pipe Dreams," publication of the company which, according to the masthead, is a "little magazine of American philosophy and good cheer." It is published every other month and is distributed to Universal's "customers, friends and prospects."

Reduce Haulage Cost With Four Plants Strategically Located

Ready Mixed Concrete Corp., Indianapolis, Ind., use two types of haulage units. Sells proportioned aggregates and cement for dump body delivery

By DAVID MOCINE



Batching and premixing plant with steel cement bins on each side. White panel is sliding door to dry-batch loading truck-way. Cylindrical hopper, left, eliminates waiting for next truck

BLANKETING the city of Indianapolis, Ind., the four plants of Ready Mixed Concrete Corp. are situated on the outskirts of town, one in each of the four geographical quadrants. Two of these four plants are located immediately adjacent to a source for aggregate, providing an adequate and inexpensive supply of sand and gravel. The remaining two plants are supplied from hoppers below tracks of the belt railroad which moves aggregate in from local sand and gravel plants at switching rates.

Progressive ideas of Dolly Gray, president, are evident throughout all four plants. These ideas touch on all phases of the business from aggregate supply to means of adding air entraining agent to the mix. They also deal with design of ready-mixed concrete delivery trucks and a method of meeting the Indiana state law requiring separation of cement and aggregate until arrival at highway construction sites.

Average bulk cement consumption of the four plants runs to more than 65 cars per month, and in the summer season combined production of all four plants is 4000- to 5000-cu. yd. of concrete per week. Peak production was reached in 1942, with 225,000-cu. yd. of ready mixed concrete produced and delivered. The south plant (No. 3), which has produced as high as 850-cu. yd. of ready mixed concrete in a 10-hr. day, is the most modern of the four, and is described herein in detail. A fleet of 32 agitator trucks and 3 non-agitating trucks is operated by the company for ready mixed concrete delivery, including three 2-cu. yd. Smith's; fourteen 4-cu. yd. Rex's; five 4-cu. yd. Jaeger's and seven 6-cu. yd. Rex's. The company plans to place its four 6-cu. yd. agitators on 6-wheel Mack trucks equipped with Cook Brothers' heavy-duty rear ends and the nineteen 4-cu. yd. agitators on Ford chassis equipped with Grico rear ends, during 1948. Also planned is a new maintenance garage and machine shop with space for repair parts and material storage, to be started in 1948 and completed the following year. The entire fleet is housed at the north plant (No. 1) and routed to the four plants each morning depending on orders assigned the particular plant for the day.

Dump body for hauling concrete, in tilting position. Body holds 4 cu. yd.

A non-agitating type dump truck body for pre-mixed air-entraining concrete delivery has been used successfully for one year, for deliveries to a maximum radius of ten miles. This body, of Mr. Gray's design and patent,

has recently been duplicated and with minor refinements is being mounted on two new 5-ton Ford trucks. The company expects to add six additional non-agitating bodies on new two-speed axle Ford trucks to the fleet in the coming year. Essentially, these 4-cu. yd. bodies are totally enclosed and, when fully tilted for dumping, assume an angle of about 80 degrees with the discharge spout 42 in. above ground level. A longitudinal inverted V-member runs the full length of the body about 8 in. above a 9-in. radius rounded bottom which aids in minimizing segregation and packing as a result of prolonged movement in transit. Concrete transported in this body is reported to be in exceptionally fine condition from the standpoint of consistency of mix at point of discharge. Designed to provide complete discharge of concrete, it permits drawing off the bottom of the load first, thereby reducing segregation and bleeding.

To meet the requirements of the big Indiana state highway building program, the company was required to deliver concrete materials to highway job sites, with the cement and aggregate unmixed. A system was worked out whereby the aggregate and cement weigh batchers of the existing ready-mixed concrete plant are used for proportioning. After sand and aggregate are measured in the weigh-batcher, they are diverted from the mixer by a flop gate and chuted to either half of a cylindrical hopper over a truck-way under the plant. This hopper is fitted with two pneumatic discharge gates that may be operated individually or together and are controlled by Hanna air cylinders. These gates discharge material to two sections of a dump truck body. Cement is chuted to two additional sections in the truck body from a dual bulk cement weigh-batcher on the same floor of the plant as the aggregate weigh-batchers. In this way cement and aggregate for two complete mixes are kept separate in one divided truck until dumped into the contractor's mixer at the job site.

Introduce Air-Entraining Agent Through Calibrated Glass Tube

In the dry-batch system, Darex air-entraining agent is added to the sand while it is still in the weigh-batcher and, according to state highway concrete inspectors, gives excellent air entrainment results. This air-entraining agent is added from a calibrated glass tube located at the weigh-batcher operator's eye level, which may be filled or contents discharged to the mix by turning a petcock — another Dolly Gray idea.

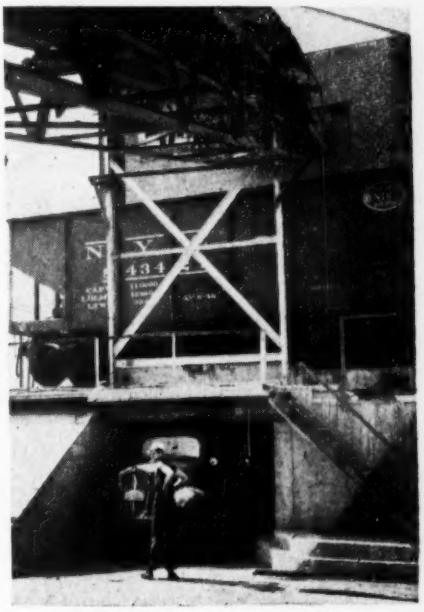
Dry Batch System

With the dry-batch system, two batches are deposited per truck simultaneously, with the complete cycle taking 1½ minutes from dumping one load to filling the hoppers with accurately weighed material for the next. A record for the dry batch system is 518 batches (259 truckloads) in a 9½-hr. day; while at the same time ready mixed concrete was being delivered to mixer trucks at the side of the plant. Each dry batch equals 1⅓-cu. yd., or 2⅔-cu. yd. per truck load.

Newest and largest capacity plant of Ready Mixed Concrete Corp., south plant (No. 3), is located on land leased from the Indianapolis "A" plant of American Aggregates Corp. Sand and gravel are delivered directly from the stockpiles of the aggregates plant to a large live storage silo leased by the ready-mixed concrete company.

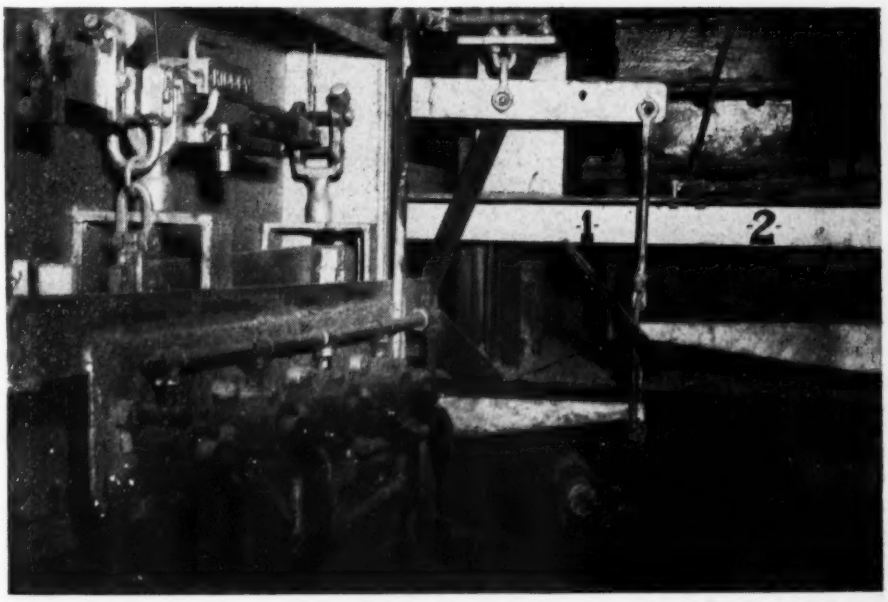
Sand and coarse aggregates are reclaimed on a 30-in. belt conveyor, 340 ft. centers, in a tunnel under the stockpiles and sand silos of American Aggregates Corp. Stockpiles contain four sizes of aggregate, and the five sand silos are each of 800-ton capacity. Built in 1944, the reclaiming tunnel contains 16 manually-operated discharge gates; two of which are frequently opened at the same time to provide maximum belt load of 100 t.p.h. When material is to be loaded for the American Aggregates Corp., belt travel is to the south end of the tunnel where a transfer belt elevates it to a washing screen station, from which it can be chuted to either truck or rail car. By reversing direction of the belt travel, material is delivered to a bucket elevator of the same capacity as the belt for elevation to the concrete company's silo. Both belt and bucket elevator are powered by 40-hp. General Electric motors.

Delivery of aggregate is the responsibility and property of American Aggregates Corp. until it is discharged from the bucket elevator to a swing spout located on top of the silo. Because plant No. 3 is located adjacent to an unlimited supply of aggregate with no freight or haulage costs, this plant of Ready Mixed Concrete Corporation has a distinct economic advantage. Due to its location, plant No. 3 can economically truck concrete to and beyond either of the two less favorably situated plants of the company.

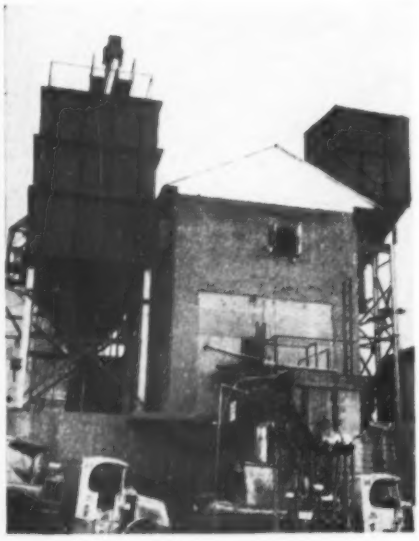


Looking toward batching plant. Conveyor, above, is from the silo. Loading lightweight aggregate into truck. This will be superseded by belt conveyor

The aggregate silo, of poured-in-place reinforced concrete, is 56-ft. high and 25-ft. in diameter, with housing for the swing spout mechanism adding another 20-ft. to the height. Steel plates bolted to the walls through flanges divide the interior of the silo into six sections of 120 tons capacity each. Two sections contain



Automatic weighing mechanism for dry-batch plant. Dual bulk cement hopper in the background



Side view of batching plant with cement bins on each side. The hopper immediately in front of the mixer truck loading hopper receives the waste by pipe from the conveyor belt cleaner

Close-up of telescoping chute

Looking up to bottom of dry-batch hopper: one pneumatic gate is open, one is closed. Cement chute may be seen in the center

Two of the new 4-cu. yd. dump bodies on 5-ton truck chassis

sand; two sections minus ⅝-in. gravel; one, plus ⅝-in. gravel; and one, minus 2¼-in. gravel aggregate. Should an order call for lightweight concrete, one of the sand sections is emptied and refilled with either Haydite or Waylite. These lightweight aggregates are brought in by rail on a raised siding adjacent to the plant and dumped to a track hopper that has provision for delivery of the material to trucks. It is then transported 65-ft. to the base of the bucket elevator (owned by the American Aggregates Corp.) for elevation to the silo. When time permits, a conveyor system will be installed for this lightweight aggregate transfer from siding to elevator boot. Bagged Vermiculite has been used as aggregate in lightweight ready-mixed concrete for some special orders.

In the bottom of the silo is a sloping steel false bottom that centers over a weigh-batcher, the top of which is 10-ft. above ground level. The operator for this weighing station stands on a wooden platform 5-ft. above ground level where the scale arms and levers are located conveniently for pneumatically controlling aggregate flow. The weigh batcher discharges by a pneumatically-controlled clamshell gate to a 30-in. inclined, enclosed belt conveyor, 75 ft. centers, for delivery to the top of the mixer building, where the aggregates are dumped directly into a chute serving either the mixer or the dry-batch hopper.

Intercommunication System

An intercommunication system between mixer floor and silo weigh station allows the mixer operator to change the type of mix immediately. Power is supplied to the belt through a Link-Belt speed reducer from a 10-hp. G. E. motor. A Robins belt cleaner is mounted under the belt following the point of discharge to the mixer chute. Wash water from this cleaner is piped to an elevated steel truck hopper outside the mixer building. Fines settling out in this hopper are trucked to waste when it becomes filled.

Bulk cement is brought in by rail over the elevated siding, mentioned previously, where it is discharged to a 400 bbl. track hopper on the north side of the plant and, on the south side, cement is discharged directly to a screw for delivery to a 200 bbl. bin. The lightweight aggregate hopper is between the two cement discharge points. The 400 bbl. cement hopper is provided with a screw conveyor 10-ft. long that delivers the cement to a bucket elevator for elevation to a 600 bbl. steel storage bin. These bins as well as the 400 bbl. track hopper were designed by Dolly Gray and built in the company shop. The south bin, of 260-bbl. capacity, forms a dead storage or stand-by bin; while the north unit, of 600 bbl. total capacity, is a bin within a bin with the inner unit providing live storage of 300 bbl. The inner bin is filled from the track hopper bucket elevator; while the outer bin, which completely surrounds it, serves as overflow storage space. The outer bin discharges by gravity to the bottom of the elevator boot for re-elevation to the inner bin when required. Both elevators are powered by 7½-hp. Master Electric gear-head motors. All screw conveyors and bucket elevators in the plant are of Link-Belt manufacture.

Cement is drawn from both the north and south bins by screw conveyors that discharge directly to a cement weigh-batcher, located over the mixer and at the same level as belt discharge from the aggregate silo. Concrete is pre-mixed in a 2-cu. yd. Ransome mixer powered by a 40-hp. Fairbanks-Morse electric motor. Mixing time depends on the length of haul for the next order to leave the plant. A flow meter for mix-water proportioning is on order, and when delivered will be installed — doing away with the tank now used.

Dry-batch hopper discharge is over a fully enclosed truckway under the plant, while ready-mixed concrete is chuted from the mixer to a 4-cu. yd. cylindrical truck hopper immediately alongside the mixer building. Provision of a surge hopper at this point in the flow greatly speeds up plant operation. When there is even a minute or two delay in arrival of the next truck under the mixer spout, as for example when a little extra time is spent by the truck driver in washing out the truck discharge chute, the mixer can dump to the hopper and start charging for the next batch. A conical bottom in this hopper permits complete discharge when the Hanna

(Continued on page 195)

Conveyor from silo discharging over mixer

CONCRETE PRODUCTS MACHINERY DEVELOPMENTS

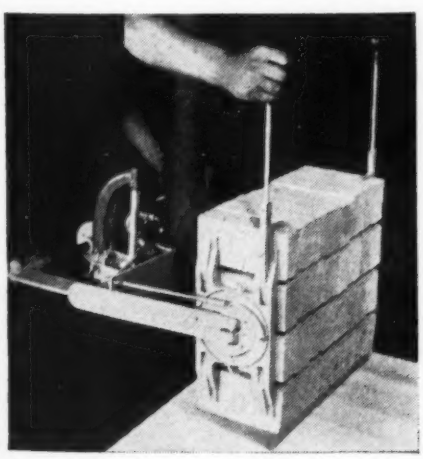
CONCRETE PRODUCTS manufacturing is rapidly emerging from its early backyard status to an industry having the technical knowledge and equipment for mass production. It is true that many of the plants are still relatively small from the standpoint of production capacity, but even within this classification the progressive companies are taking advantage of the more modern equipment now available. There is a very definite place for the smaller concrete products manufacturer in less populated centers, but the inadequately financed companies, started by men with little knowledge of the industry and the requirements for good masonry products, are passing out of the picture.

In the larger centers of population, concrete products plants costing a half million dollars or more will be erected for mass production of block, floor slabs, and lintels. Several completed plants in this category have been described in ROCK PRODUCTS.

The clay brick industry itself recognizes the growing importance of concrete products in the construction field, and a number of large clay brick companies are now large producers of concrete masonry.

Future of the Concrete House

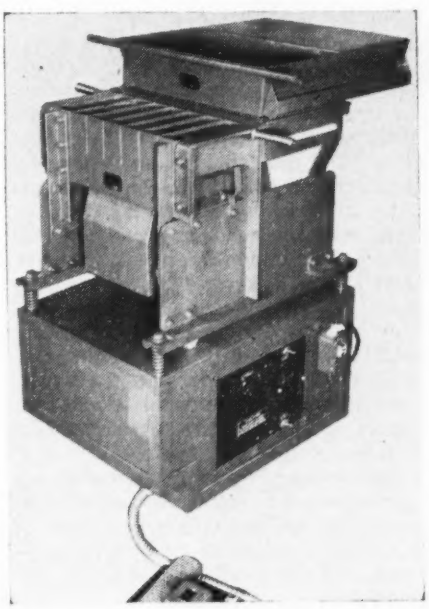
Future possibilities of the concrete products industry have hardly been scratched. For example, it is entirely possible to construct a truly "concrete house" in which practically every part of the structure would be of concrete except the plumbing fixtures, heating plant, and lighting units. Concrete masonry walls, partitions, floor slabs, roof slabs, concrete roofing tile, and stairways are nothing new to the concrete products industry. Even the bathtub, shower stall, sink, and laundry tray have been made in mass production. Gutters and downspouts of concrete could be built into the house design. There also is a big market on the farm for not only masonry units, but also for feeding troughs, water tanks, septic tanks, etc. Dwindling supplies of lumber at much higher cost are leaving the concrete products industry a heritage of future business.



Clamp designed by Besser for fast and safe handling of concrete brick. Gripping and lifting operations are powered by compressed air. This view shows the clamp holding 32 brick in position for placing brick in stock

Precast Structural Units

While the big volume in the concrete products industry undoubtedly will continue for some time to be concentrated on concrete block and brick, the day is approaching when roof and floor slabs, and precast structural members will equal, if not surpass, the concrete tonnage represented by masonry. High lumber and steel costs will cause builders to turn to concrete for the answer. The Cemenstone Corporation, Pittsburgh, Penn., has demonstrated that large structures can be built with standard design precast, reinforced concrete structural members. Time of erection and over-all costs can be greatly reduced. The Pennsylvania Highway Department is now making test installations of concrete bridges made of precast concrete sections manufactured by a Philadelphia, Penn., manufacturer, using the Billner vacuum concrete process. These are only "straws in the wind" pointing to a vast untouched market for concrete products.



Latest semi-automatic Reed brick machine

Machinery Developments

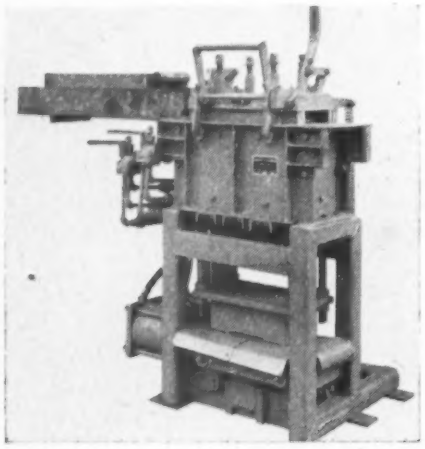
Refinements in curing practice have brought into use new flash-type, oil-fired boilers, draft and exhaust fans, and many new temperature and steam pressure controls.

Portable cubing hoist designed by Besser

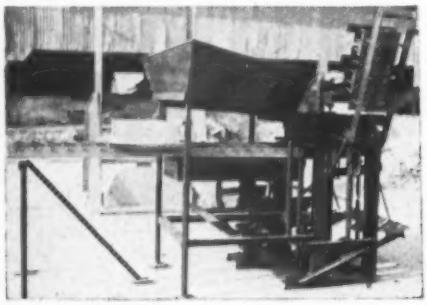
In the past two or three years, a number of new concrete block machines have been placed on the market. These machines varied considerably in production capacity, but most of this equipment would be classified in the small or medium size range. Besser Manufacturing Co. has made refinements in its Super Vibrapac, but it is essentially the same high-production block machine placed on the market a few years ago. Stearns Manufacturing Co. is testing out its larger No. 15 under plant operating conditions, and is expected to announce the principal features of this machine in the near future. Jackson & Church has made considerable progress with its mass production block machine.

J. W. APPLEY AND SON, INC., has developed an automatic drive for its Little Giant vibrator concrete block machine. This drive actuates all moving operations except removal of moulded blocks from the off-bearer. It can be attached to any Little Giant vibrator machine, either old or new. It is driven by a 1-hp. motor, rubber-mounted, through a 50-1 reduction gear. Production cycle with this drive is four 8- x 8- x 16-in. block per minute.

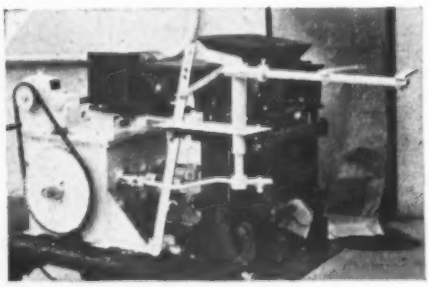
BESSER MANUFACTURING CO. has announced several new pieces of equipment. One is a brick clamp, operated by compressor air, for fast and safe handling of concrete brick. The brick clamp is interchangeable with the Besser block cuber clamp on either the new portable or stationary block cuber, and is operated by the same air cylinder and hoist. Mortarless Tile Machine Co. has brought out a new type hydraulic power block machine with a capacity up to 2500 block per day. These machines manufacture the standard mortarless interlocking concrete block under a territorial fran-



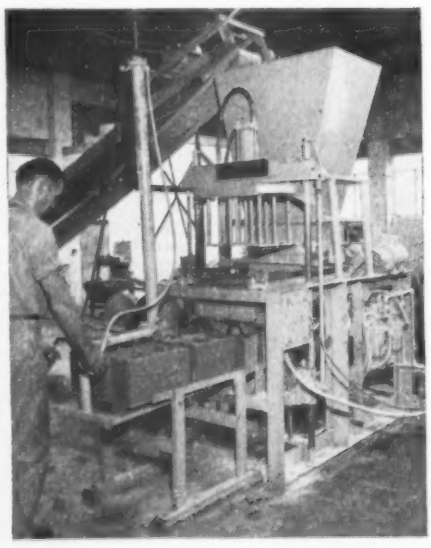
Machine to produce Mortarless concrete block up to 2500 per day



A Sampson vibrating block machine which incorporates a roller conveyor for off-bearing



Automatic drive for all Appley Little Giant block machines, both old and new



Block machine designed by Bob Gravely Industries which features storage capacity for 120 standard size pallets back of machine

chise. Fleming Manufacturing Co. is now in production on its latest FMC180 block machine, previously described in ROCK PRODUCTS, which has a capacity of 180 8- x 8- x 16-in. units per hour. This machine is fully automatic and hydraulically operated. Bob Gravely Industries, Inc., has designed a fully automatic, plain pallet stripper which features a storage capacity of pallets back of the machine sufficient for 120 8- x 8- x 16-in. units. The pallets are fed straight through and lifted up to close the bottom of the mold box where the block is vibrated under pressure sufficient to compact sand and gravel block ½-in. after the mold is completely filled by vibration. Sampson Concrete Machinery Manufacturers, San Diego, Calif., has announced its No. 1 block machine. The machine will produce nine 4- x 6- x 12-in. block per minute, according to the manufacturer. This machine incorporates a roller conveyor in the design to take away the block after it is stripped. Leemon Engineering & Machine Co. is in production on its Electropac block machine. Another hydraulic-operated block machine is being manufactured by Western Sales & Manufacturing Co., Seattle, Wash.

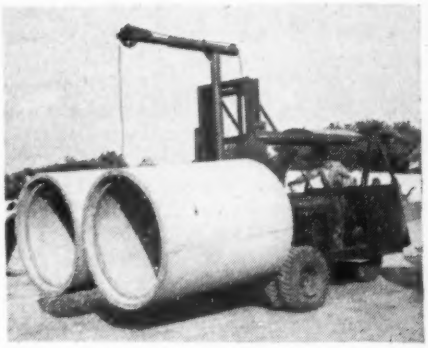
R. S. REED CORPORATION has brought out a semi-automatic brick machine known as the Vi-Brik-Crete Brick Maker for the production of seven sizes of brick. It has a production capacity of 1000 concrete brick per hour, manufacturing seven at a time. This company also manufactures the Model 753, modular brick machine, and the Little Dave Brickmaker. The Kent Machine Co. is now in production on its air-operated Lintelator, said to be the only lintel making machine for mass production. This company also manufactures a continuous concrete mixer which is coming into increasing use.

There have been no unusual developments in the manufacture of concrete pipe or its machinery except in the adaptation of the vacuum concrete process to the production of large concrete pipe.

Lift Trucks

Perhaps the most outstanding development in the concrete products industry is to be found in the methods of handling materials and the finished block. Both large and small plants are rapidly mechanizing the handling of raw materials by means of conveyor belts, bucket elevators, and screw conveyors. Accurate weigh batching systems, such as Butler equipment, also has been a major factor in stepping up efficiency.

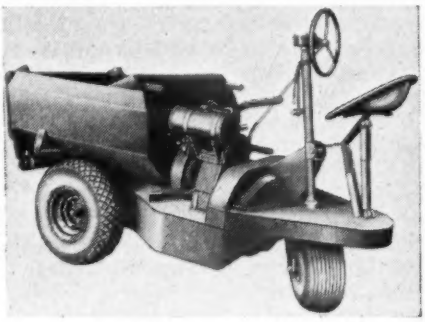
But of even more importance is the increasing use of time and labor saving equipment in the handling of concrete block and pipe from the machine to curing rooms, stockpiling, storage, and transportation to the job. The lift truck has made it possible to economically keep up with the vastly greater production of the block machines and pipe machines. Cubing of



A 5-ton Erickson fork lift truck carrying pipe

concrete masonry units has made it possible to utilize to full advantage the great economies of lift trucks.

Another development is the transportation of block to the job. Straddle lumber carriers, such as Hyster, Ross, and Gerlinger products, are adaptable to the handling of cubed block on

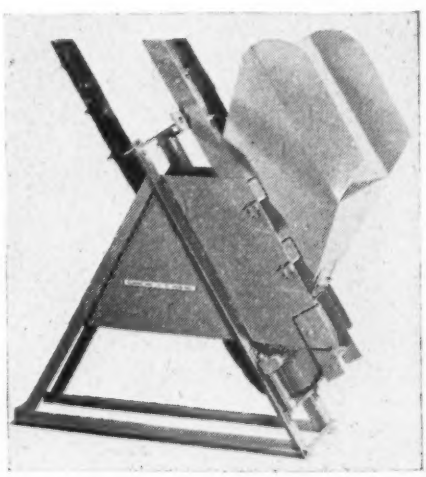


Mechanized wheelbarrow developed by Novo Engine Co.

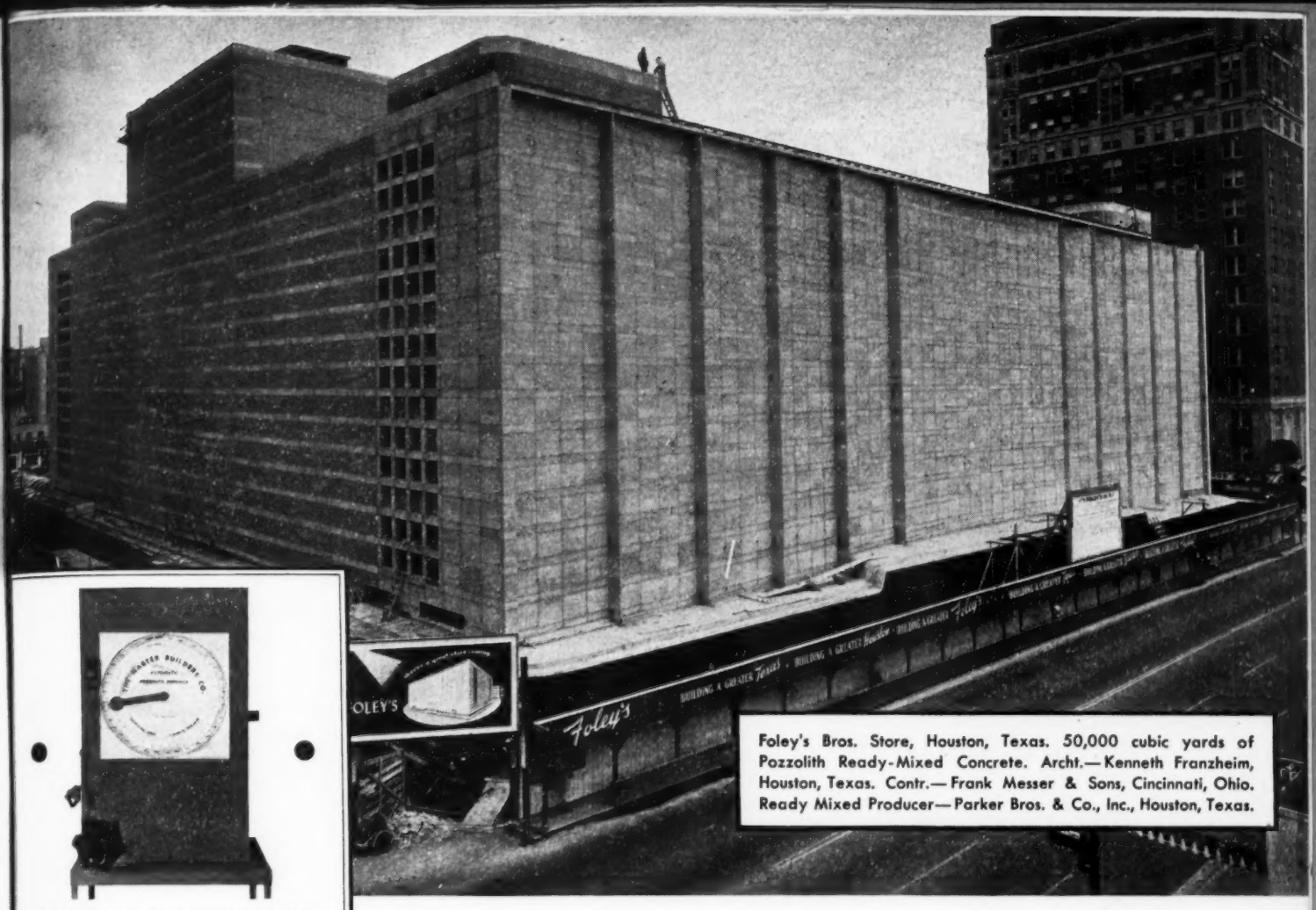
pallets directly from the yard to the jobsite without rehandling. A producer in Texas also has designed a unique semi-trailer system of haulage to the jobsite to cut down unloading time. Steel posts spaced down the center of the semi-trailer have steel members welded to the top of each post, forming a T, to the ends of which are welded trolley rails which permit cubed block to be unloaded at the end of the truck by means of a hoist.

Lightweight aggregates such as

(Continued on page 194)



Section of Fleming material handling elevator for block and ready mixed concrete plants



Foley's Bros. Store, Houston, Texas. 50,000 cubic yards of Pozzolith Ready-Mixed Concrete. Archt.—Kenneth Franzheim, Houston, Texas. Contr.—Frank Messer & Sons, Cincinnati, Ohio. Ready Mixed Producer—Parker Bros. & Co., Inc., Houston, Texas.

POZZOLITH AUTOMATIC DISPENSER

Operator delivers the correct amount of Pozzolith, in liquid form, required for a batch, by simply setting the control dial and opening valve.

OVER 150 READY-MIX PLANTS HAVE BEEN EQUIPPED WITH THIS DEVICE WITHIN THE PAST 24 MONTHS . . . WHY?

Because a producer can, at lower cost:

1. Produce waterproof concrete . . . with normal Portland cement.
2. Produce high-early strength concrete . . . with normal Portland cement.
3. Produce air entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement — stepping up production, reducing inconvenience in handling and cutting costs.

In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than with any other material on the market, added at the mixer or inter-ground.

Southwest's Most Modern Store built with

POZZOLITH READY-MIXED CONCRETE

Ready-mixed concrete for this job, produced with Pozzolith and the M. B. Automatic Dispenser, resulted in:

1. Easy, Accurate Control
2. Better Quality Concrete at
3. No Extra Cost

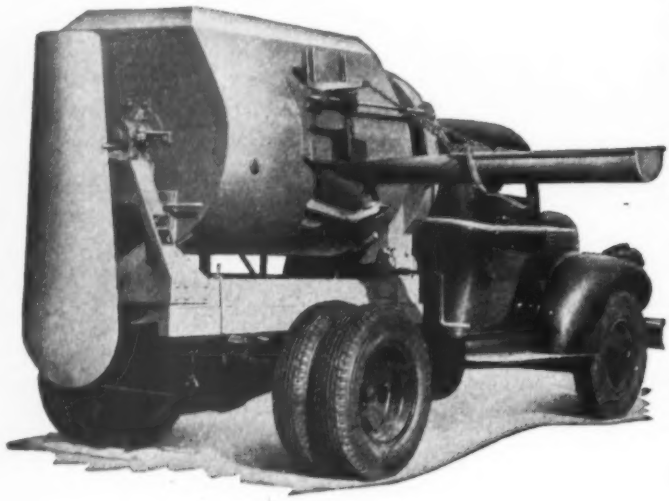
Leading ready-mixed plants in all parts of the country are producing Pozzolith Concrete for the same reasons.

Write for complete information.

The MASTER BUILDERS Co.

CLEVELAND 3, OHIO — TORONTO, ONTARIO

The New HIGH DISCHARGE *Transport* TRUCK MIXER



★ FAST OPEN TOP CHARGING
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★ SUPERIOR MIXING PRINCIPLE
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★ ALL STEEL CONSTRUCTION
★ LOW MAINTENANCE
★ ALL BEARINGS FULLY PROTECTED
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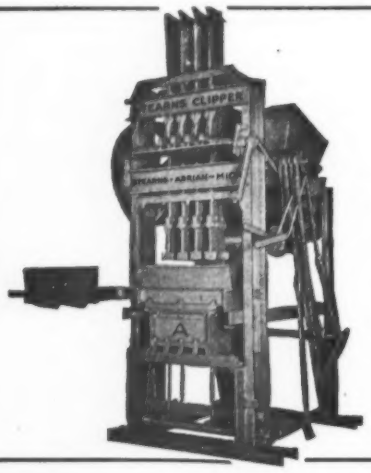

"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Stearns Clipper Stripper Machines, Stearns Joltcrete Machines; Stearns Mixers; cast Iron and Press Steel Pallets. Straublox Oscillating Attachments, etc.

Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

ANCHOR CONCRETE MCHY. CO.
G. M. Friel, Mgr., Columbus 8, Ohio

CONCRETE BURIAL VAULTS
AMERICA'S FINEST MOLDS AND LOWERING DEVICES
TERRITORY FRANCHISES
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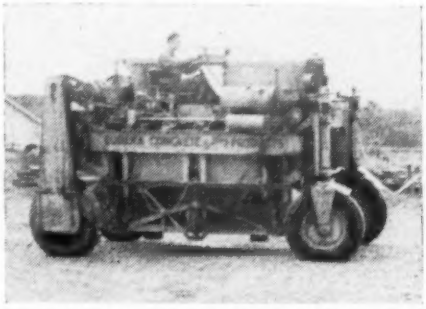
EQUIPMENT DIVISION
1620 LUCAS HUNT RD. ST. LOUIS 20, MO.

JOIN 11,300 PRODUCERS WHO REGULARLY READ ROCK PRODUCTS

Concrete Products Machinery

(Continued from page 192)

Waylite, Haydite, and Celocrete are coming into increasing use throughout the country. In the West, pumice, pumicite, perlite and other natural and processed volcanic materials are



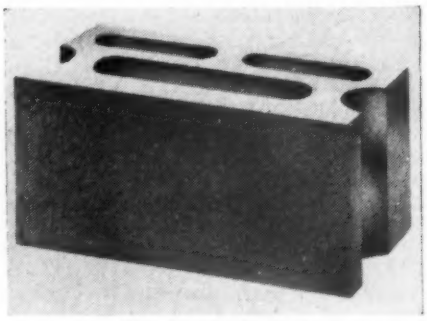
Eureka Concrete Products Co. has adapted Ross carrier truck to haul block on pallets to jobsite

being used in large volume. Shortage of cinders in the East has led to the development of Sinterlite.

Air-entraining cements are being used in large volume by concrete products manufacturers. Another development is use of admixtures, such as Pozzolith, Darex, and other similar products.

Furred Block

F. C. GEORGE MACHINE CO., Orland, Fla., manufacturers of block machines, also have developed the Redi-Furred block design. Mr. George had designed a furred block a number of years ago, but its construction made it difficult to manufacture. F.H.A.



Furred concrete block

requirements of furring before plastering on conventional block wall made construction slow and costly. This brought the conception of the idea of building the furring strip and extra longitudinal air space into a block of standard or modular specifications. The block, shown in the illustration, is being made in all the commonly used sizes.

These blocks are now being used in several large private and public building projects throughout the country, chief of which is the Tilton Terrace Apartment house project at Madison, Wis., by the Tilton - Cameron Corporation. This project consists of 36 buildings of six apartments, each requiring a total of 220,000 Redi-Furred cinder block furnished by the Madison Redi-Furred Block Co.

Batching

(Continued from page 190)

air-cylinder controlled gate is raised. The discharge gate is comprised of a vulcanized hard rubber cone that forms a water tight seal when lowered into position with the weight of concrete in the hopper pressing it down.

When a transit-mix truck is spotted under the hopper, the driver lowers a telescopic chute by means of a large sprocket wheel, making direct connection between the bottom of the concrete hopper and the port on top of the mixer drum. Four cubic yards of concrete are discharged in 20 seconds. This idea, too, is of Mr. Gray's design; and is helpful in loading concrete without spillage. It has several advantages as all the concrete mixed in the plant is delivered to trucks, and there is no slopping of concrete over the side of the trucks, thus preserving the advertising value of clean equipment. If the telescopic chute is left in a lowered position by the lead truck, a signal light warns the following driver not to drive under the hopper until the chute is raised.

Heat Water and Aggregates

In keeping with the policy of using all space available to best advantage, the 100 hp. Cleaver-Brooks fully automatic oil-burning boiler used to heat mix-water in the winter and also for plant and silo heating is located under the elevated track siding. This entire plant was built two years ago and incorporates all the improved methods evolved through years of operation of the three other plants. The mixing operation is housed in a brick building, three stories high and almost square in floor plan (25- x 30-ft.).

Officials Are Trained

C. A. Earle is plant manager at the new installation and Cecil Davis is plant manager at plant No. 2. Johnnie Baker is chief dispatcher at the main office (plant No. 1), where all orders are taken and from which all trucks are dispatched for the day's deliveries.

Ready Mixed Concrete Corp. employs six graduate engineers: C. "Dolly" Gray, president, who is vice-president of the National Ready Mixed Concrete Association; H. O. Wimsett, concrete technician; F. W. Guthrie, mechanical engineer; W. R. Kniptash, salesman; and F. S. Hill, superintendent of transportation—all graduates of Rose Polytechnic Institute. Strallon B. Cralle, superintendent of plant operations, is a graduate of Oklahoma University. The younger engineers, Messrs. Cralle, Kniptash and Guthrie, have completed two years of boot training under the direction of Mr. Wimsett in the design and control of concrete mixes. This training period included work as laborers, garage mechanics, welders and mixer operators. E. S. Horne, sales manager, has been connected with the construction industry in Indianapolis for 40 years and with the company for 16 years.

BUY KENT and Get

Air Controls are also adaptable to older KENT Tampers and Strippers

PROVEN PERFORMANCE

plus Advanced Refinement

Consider for example this Kent Tamper and Stripper. Both have been widely popular for many years. And now, in refined form they are available with air controls.

Simply operate the valves and both machines respond instantly — positively — efficiently. Since the labor element is minimized the normal large output of these time proven machines is "stepped up".

Yes, you can buy Kent equipment with assurance of satisfaction.

Consider, too, that you can start with one or more Kent machines and later add related and coordinated KENT units as developments justify. Or if you are starting in business, you can do no better than to purchase a complete KENT plant with continuous or batch mixer and all units developed to operate speedily, efficiently, profitably with other units.

Get the Kent story. Check the coupon below, write your name and address in the margin, tear off and mail.

TWO TO THREE WEEKS DELIVERY ON ALL EQUIPMENT

The KENT MACHINE COMPANY

Manufacturers of CONCRETE PRODUCTS MACHINERY *Since 1925*

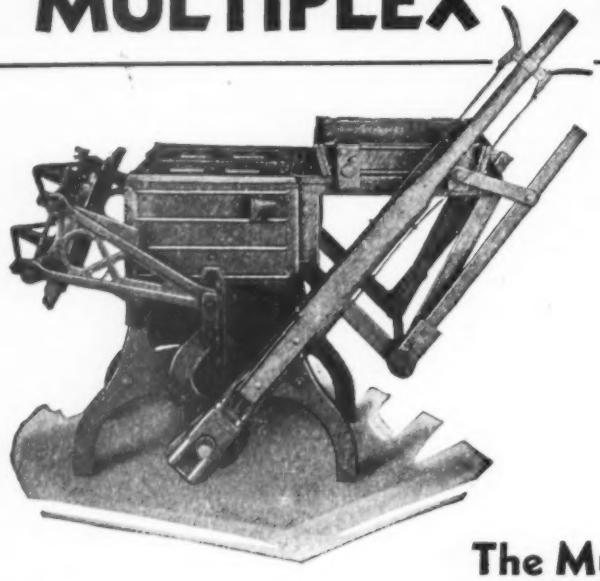
CUYAHOGA FALLS, OHIO, U.S.A.

CP

☐ KENT Vibra-Tamp
☐ KENT Batch Mixers
☐ KENT Continuous Mixers
☐ KENT Aggregate Elevators
☐ KENT Elevators
☐ KENT Lift Trucks
☐ KENT Strippers
☐ KENT Steel Racks
☐ KENT Feeders
☐ KENT Pallets
☐ KENT Tampers
☐ KENT Dunkers

Two Men Will Produce 700 to 1000 Blocks a day from a semi-wet mixture with . . . . .

MULTIPLEX Double Stripper



You need no power, no skilled labor. The machine is filled with concrete then scraped off level; the lever is pulled down pressing the blocks under a 40-ton pressure applied from both top and bottom; the lever is then reversed ejecting the block.

By using a semi-wet mixture you get a hard, waterproof block, and you save on labor and the expense of steam-curing. Blocks are made two at a time in one operation, troweled on all sides, compacted uniformly to the extreme sides, leaving all sides perfectly square.

Remember that over 40 years of experience are built into every Multiplex machine. Regardless of the price, we never compromise the workmanship or quality of our product.

The Multiplex Concrete Machinery Co.
ELMORE, OHIO

For 40 years, builders of the finest concrete plant equipment.

Simple! Remove the crate, put on the lever, read the operating instructions, and start producing.

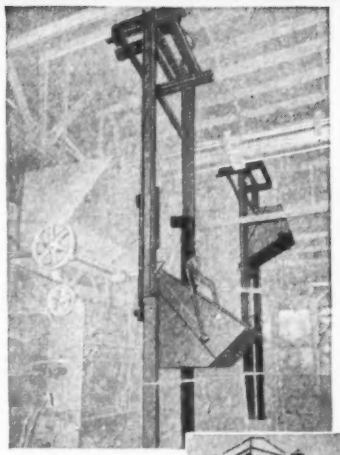
★ *Available For Immediate Delivery*

DODSON-McCORD
BOWL-LESS CONCRETE MIXER

Popular with plant owners for more than ten years. All parts replaceable. Interchangeable staves prevent shutdowns. Spiral blades mean fast, thorough mixing. Dust proof, sealed, self-aligning ball bearings mean low power demand. Ruggedness means long life and low upkeep.

DODSON
SKIP HOIST

A real companion to the Dodson-McCord Mixer, and an efficient installation in any concrete products plant, foundry or load lifting operations.



Manual or automatic controls, variable heights and angles, pit or level installation. Adaptable to any plant condition.

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If you are buying wire rope get the help of an experienced American Cable engineer. Every salesman of American Cable wire rope has the exact specification (construction and grade) for every wire rope application. He can save you time and money. Write for him today.

LASTS LONGER

HANDLES EASIER

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ACCO Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

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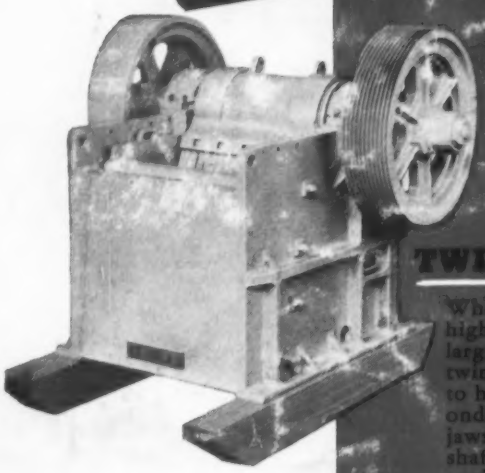
TRADE MARK

In Business for Your Safety

5 RIGHT ANSWERS
...to your crushing problems!
5 CEDARAPIDS CRUSHERS

PRODUCT OF IOWA

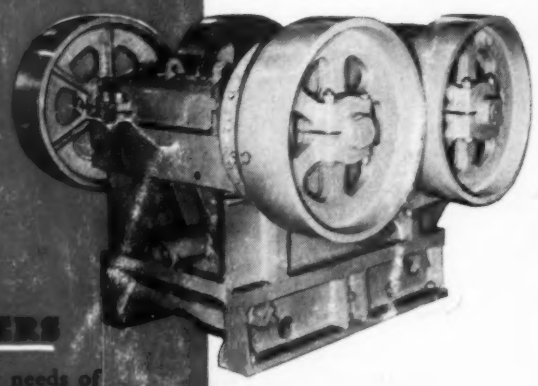


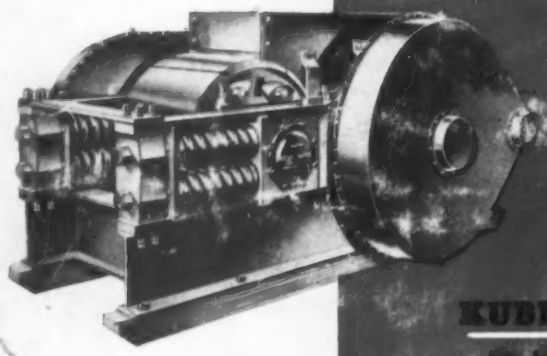
JAW CRUSHERS

Engineered in every detail for smooth, steady performance, lower maintenance and operating costs, and extra capacity. There's a complete range of sizes for primary and secondary crushing in all types of portable and stationary plants.

TWIN JAW CRUSHERS

Where there is an unusually high percentage of crushing of larger sized gravel, a Cedarapids twin jaw crusher may be used to handle the primary and secondary crushing. Two movable jaws operated by two eccentric shafts provide much greater capacity and smoother operation.



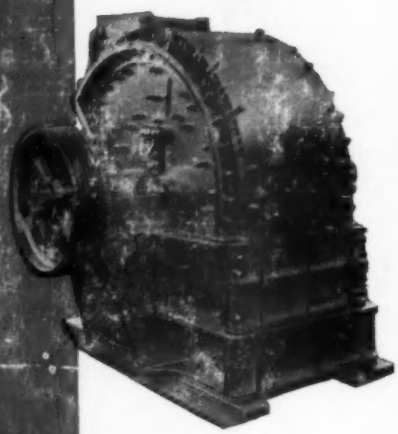


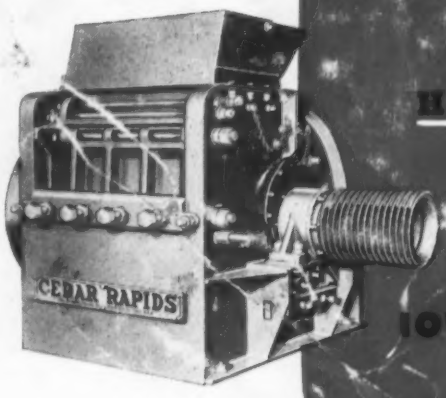
ROLL CRUSHERS

Seven sizes to fit your needs of larger production of smaller sized aggregates at lower cost. Available with two smooth, or two corrugated roll shells or with one of each depending upon finished product desired. Exclusive shear plate protection for shaft and bearings.

KUBIT IMPACT BREAKER

"Kubitized" aggregate with its uniformly angular surfaces, makes much stronger concrete, bituminous, or macadam construction. Hammers mounted on a rotor knock the stone against breaker bars breaking the stone along its natural lines of cleavage. Available in 4 sizes.





HAMMERMILLS

Cedarapids Hammermills will produce either crushed limestone up to 1½" size or ericultural lime, or a percentage of both, depending upon the setting of the grates and the speed of the rotor. Offered in 3 sizes, and in complete portable combinations as well.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

Cedarapids — Built by IOWA

The Iowa Line *of Material Handling Equipment Includes*

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
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STRAIGHT LINE ROCK AND GRAVEL PLANTS
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DRAG SCRAPER TANKS
WASHING PLANTS
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STEEL TRUCKS AND TRAILERS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS

For details on Cedarapids crushers, ask for Bulletin CC-1 or see your nearest Cedarapids dealer.